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DISEASES *of the* CHEST

VOLUME XIV NOVEMBER-DECEMBER, 1948 NUMBER 6

Facts and Fancies in the Management of the Seriously Ill Patient with Bronchial Asthma*

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Contrary to the pessimistic view frequently expressed by the patient and his friends, considerable benefit can be given to the very sick asthmatic by the application of procedures to be discussed. These measures are based largely on personal experience in the management of 513 patients with severe bronchial asthma and have been correlated with extensive laboratory studies with a large variety of protecting drugs employing a method of human assay to be described. I have attempted to illustrate (Fig. 1) the various measures which are necessary to balance the delicate therapeutic seesaw of the sick asthmatic subject and will limit myself to a discussion of the more important.

Protecting Drugs: Correlation of Laboratory and Clinical Data

Two substances (histamine and acetylcholine have been considered possible chemical mediators of allergic phenomena. Both of these substances are capable of producing dyspnea and bronchospasm in asthmatic subjects and may be used in the evaluation of drugs capable of protecting against these effects.[1,2] With this technique, a method of human assay of the relative value of new and accepted therapeutic agents[3,4,8,9,10] for the relief of bronchial asthma has been evolved.

A protection study consists of determining the effect of a bronchospastic agent on vital capacity of the lung (Fig. 2) before and

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at twenty to thirty minute intervals after the administration of a protecting drug (drug under investigation). The resultant decreases in vital capacity are compared to the control drop. "Protection" was demonstrated when the administration of histamine or mecholyl chloride caused either no drop in vital capacity or a drop distinctly less than the control amount. Protection was lost when the decrease was once again equal to the control drop.

Any one protection study in a single individual may have little general relevancy. The degree of protection is expressed in terms applicable to many subjects so that the data may be massed into averages of greater statistical value.[10,11] During a period of protection, the decrease in vital capacity produced by the same dose of bronchospastic agent will, by definition, be less than the control drop. The percentage difference between these two values represents the measure of protection. For our calculations, we have used the following equation: $P=100\ (C-E)/C$. P represents the percentage of protection (100 per cent indicating absence of any decrease in vital capacity after an injection of histamine or mecholyl chloride): C, the control drop; and E, the decrease similarly produced at any given time after the protecting drug has been administered. Each curve represents the average result of a minimum of several studies according to the above formula.

We have employed, by aerosol as well as by intravenous route,

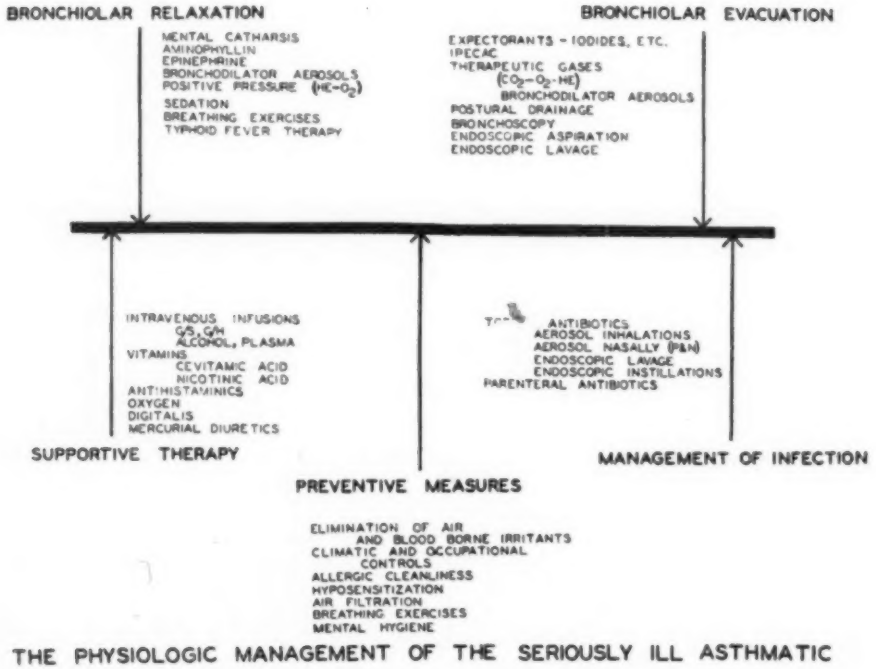

FIGURE 1: CHART

histamine, acetyl-beta-methylcholine and allergenic extracts as bronchospastic agents. With this human assay method, we have investigated various classes of drugs including anticholinergic agents,[12] adrenergic agents,[13] aminophyllin[14] by all possible routes, antihistaminic agents,[15] Cytochrome-C, Khellin and a number of other miscellaneous drugs. We have obtained statistically valuable data describing the degree of protection afforded by a given protecting agent against a bronchospastic drug. This technique has afforded us the opportunity of making these studies under controlled conditions usually not present in the sick patient. Some of these observations will be discussed briefly.

It would appear from this data that the combination of a good antihistaminic and a good anticholinergic drug would be an ideal therapeutic agent in bronchial asthma. Two drugs, aminophyllin and epinephrine, are very valuable in the management of the asthmatic. According to our laboratory data, epinephrine is a good antihistaminic and anticholinergic agent and also works very well in clinical asthma. Aminophyllin,[14] on the other hand, is a fair antihistaminic but a poor anticholinergic agent. Nevertheless, it is excellent for the clinical management of the asthmatic patient at certain intervals in his illness. When it fails, for instance, in certain stages of status asthma, one may infer perhaps that an excess of choline is present at that particular moment. We have also been able to demonstrate with many of the new antihis-

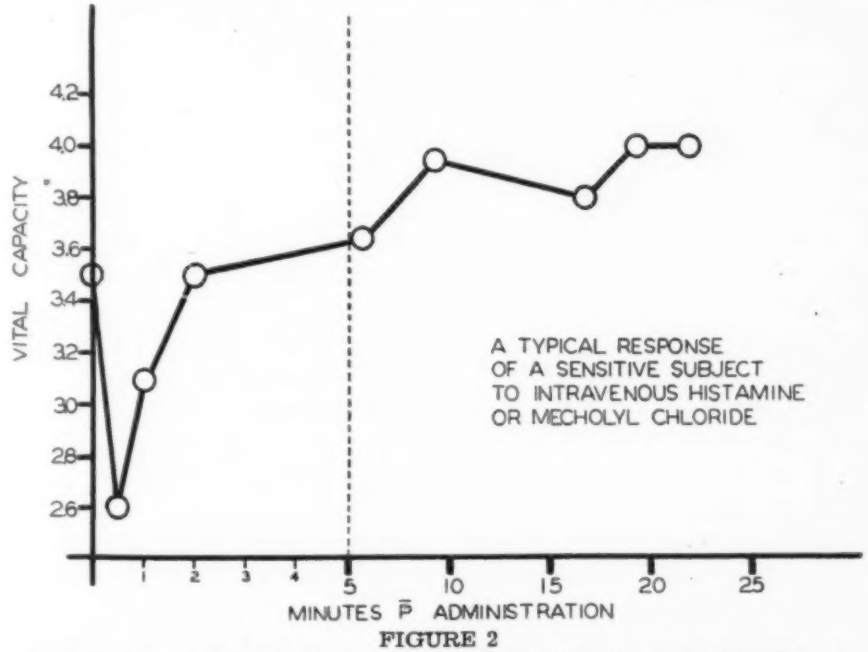

FIGURE 2

Typical drop and restoration of vital capacity after the administration of intravenous histamine or mecholyl chloride to an asthmatic subject.

taminic[15] preparations excellent protection against histamine-induced dyspnea and bronchospasm in asthmatic subjects. Yet, for the most part, these agents have very limited value in the management of the sick asthmatic when administered orally.

Parasympatholytic agents,[12] particularly atropine, scopolamine and Bellofoline, have demonstrated excellent anticholinergic protection in our laboratory. The central sedative effects of hyoscine and hyoscyamine are very desirable. However, the drying effect of these alkaloids on the mucous membranes of the tracheobronchial tree may lead to further inspissation of the already semi-solid mucus plugs, making coughing and their expulsion more difficult. These untoward effects may lead to further asthma, atelectasis or asphyxia. These anticholinergic agents may be of some value in the depleted sick asthmatic who is hypotensive and sweating profusely, and may be considered to exhibit a systemic picture of parasympathetic stimulation.

Because of the tremendous interest in the various bronchodilator aerosol preparations, we undertook a comparative study of the protective abilities of Vaponefrin aerosols (racemic methyl amino-hydroxy-ethyl-dihydroxy-benzene Hcl), Isuprel[17,18] (1-(3′ 4′ Dihydroxy-phenyl)-2-isopropylaminoethanol) and epinephrine 1:100 against the effects of intravenous histamine, and mecholyl-induced dyspnea and bronchospasm in asthmatic subjects.

Epinephrine aerosol 1:100 demonstrated 75 per cent immediate protection against the effects of histamine. This degree of protection was short lived and at the end of ten minutes had dropped to below 40 per cent, the level we consider significant. Its protection against the effects of mecholyl was less marked, ranging from immediate protection of 56 per cent to 40 per cent at the end of ten minutes. Vaponefrin aerosol demonstrated 93 per cent immediate protection against the effects of histamine. Moreover, this degree of protection wore off more gradually than with 1:100 epinephrine and significant protection (40 per cent) was still present at the end of twenty-seven minutes. Its protection against the effects of mecholyl was less marked than against histamine, ranging from immediate protection of 70 per cent to 40 per cent at the end of ten minutes. Thus, Vaponefrin demonstrated greater immediate and more prolonged protection against the effects of histamine and mecholyl than aerosols of epinephrine 1:100.

Isuprel 1:200 demonstrated 70 per cent immediate protection against the effects of histamine. This protection dropped to 40 per cent at the end of twenty minutes. Surprisingly, it proved to be of greater protecting value against the effects of mecholyl; 70 per cent immediate protection dropped slowly to 40 per cent at the end of forty minutes. Thus Isuprel 1:200 demonstrated more

prolonged protection against the effects of mecholyl than either 1:100 epinephrine or Vaponefrin, but less immediate and prolonged protection against the effects of histamine than either 1:100 epinephrine or Vaponefrin. Isuprel 1:100 demonstrated excellent immediate protection (90 to 100 per cent) against the effects of both histamine and mecholyl. This protection against the effects of mecholyl and histamine dropped gradually to 40 per cent at the end of seventy-five and sixty minutes respectively. Thus Isuprel 1:100 proved to be the most effective agent for protection against the effects of histamine and mecholyl in the laboratory. However, the concentration of 1:100 Isuprel is too prone to produce disturbing side reactions for routine clinical use.

These laboratory studies confirm what we have previously[17,18] reported in the clinical management of the asthmatic subject. Both Isuprel 1:200 and Vaponefrin are effective bronchodilator aerosols with powerful immediate bronchospasmolytic properties, albeit short-lived. Isuprel offers the best protection against the effects of acetylcholine; Vaponefrin the best against the effects of histamine. Clinically one patient's asthma frequently responds better to one of these drugs than the other. The reverse order of efficiency may be true in the same patient at another time. Refractoriness to both drugs may develop but loss of sensitivity to one is not transferable to the other. Individual tolerance also varies. Both of these drugs have a valuable place in the therapeutic seesaw and the clinician can determine by careful observation the need for one or another of these drugs.

Drug Tolerance

The incidence of true drug allergy (idiosyncrasy) is considerably higher in asthmatics than in normal subjects. Furthermore, sensitization may occur following the second administration of a drug after an interval of one to four weeks. This is particularly true of pontocaine,[19] and many of the serious reactions and deaths observed have occurred with second usage at the time of repeat bronchoscopy or bronchography.

Certain drugs, particularly opium and morphine, should be avoided. Other drugs such as aspirin, quinine, quinidine, pontocaine, cocaine, sulfonamides, penicillin inhalations, intravenous sedatives (particularly sodium pentathol which may produce bronchospasm) and intravenous sclerosing agents, should be used with caution. Accidental intravenous injection of drugs or allergenic agents[20,21] may also explain sudden collapse and death. Even idiosyncrasy to iodides may be occasionally observed.

The majority of patients in status asthma soon become intolerant of most drugs—witness the frequency of nausea, vomiting, rest-

lessness, itching of the skin and nose, rashes and edema of the lips. No true sensitivity to adrenalin or aminophyllin has been reported; however toxic reactions and intolerance to both of these drugs may occur. Furthermore, deaths[22-24] have been reported attendant with their use intravenously.

Sedation

It is best to avoid heavy sedation, as the incidence of obstructive asphyxia and pulmonary edema is highest in the heavily sedated patient. Agents should be used which have a wide margin of safety. The barbiturates and morphine lower the threshold of the respiratory center until it is less sensitive to stimulation than normal. Barbiturates on the whole are disappointing.

If one must use the barbiturates or morphine pre- or post-operatively, it is best to administer supplementary oxygen. I have found the combination of chloral hydrate and sodium bromide of particular value in the management of the patient with status asthma. This combination can be given rectally in doses of from 1 to 3 gm. each and may be repeated at twelve hour intervals for several days without fear of serious depression resulting.

Now a word about morphine—occasionally one sees a very striking result with the initial use of morphine—e.g. 1/6 or 1/8 gr. subcutaneously. With repeated doses, however, serious sequellae may follow. I prefer to avoid the use of morphine in all asthmatic patients. On the whole, morphine tends to depress the respiratory rate and diminish the tidal volume, thus increases the degree of hypoxia, decreases the cough reflex, prevents getting secretions up and out, and tends to increase bronchospasm. In addition, there is always the possibility of hypersensitivity and addiction to the drug itself.

In the laboratory, we have found demerol[25] a fair anticholinergic drug. Scopolamine (levorotatory hyoscine) has a stronger action than atropine on the secretory glands and has a more marked central sedative effect. It has proven to be an excellent anticholinergic drug[12] when administered subcutaneously. A combination that we have found effective clinically is demerol 100 mgm. and scopolamine 0.3 mgm.—which leads to a modified form of "twilight sleep". However, I would suggest that this combination be used with some caution. I would avoid its use entirely in the dry asthmatic. In the wet asthmatic, it may be attendant with striking success when first given, but it should not be repeated more than a second time in a twenty-four to forty-eight hour interval.

A word about anesthetic drugs—it is best to realize that all inhalatory anesthetics may produce bronchospasm. The mech-

anism of bronchial relaxation with anesthetic agents is not entirely certain. It is possible that the mental and physical relaxation permits, by some reflex mechanism, bronchial relaxation.

Ether administered rectally in doses of from 2 to 3 ounces in equal amounts of oil may be given every fifteen minutes or every half hour to produce anesthesia. The asthmatic should not be heavily sedated or anesthetized during routine treatment. Personally, I prefer doses of 3 to 5 ounces at eight hour intervals for two or three days, if necessary. Relief from intractable asthma frequently follows the state of relaxation and great expectoration induced by the ether. I have not found ether in oil by intramuscular injection of any value. Barach[26] has called our attention to the synergistic relaxing effects of helium and oxygen breathing and rectal ether. Furthermore, one may frequently observe restoration of epinephrine sensitivity in the epinephrine-fast subject after he has been so treated. The open drip method may be resorted to on rare occasions.

Paraldehyde: Paraldehyde should be used as an amnestic or hypnotic rather than as an anesthetic. It is best not to administer paraldehyde intravenously, for deaths have been reported with this route.[27] Paraldehyde should also be avoided intramuscularly because of the danger of accidental venous puncture and the possibility of ensuing cellulitis and abscess formation following the use of 8 or 10 cc. of this drug. I have found the rectal route the safest and best tolerated. Paraldehyde may be administered rectally at twelve hour intervals in doses of 20 to 30 cc. combined with either equal amounts of olive oil or in a cornstarch paste. Similar doses, prepared in iced lemonade may be given orally. However, many object to the taste and smell. Rebreathing of the volatile paraldehyde should be prevented by the sick or moribund patient. Frequently, following the rectal use of paraldehyde and/or ether, coughing or the sudden increased flow of mucoid secretions may be invoked—generally to the patient's benefit.

To complete the subject of sedation and anesthetic drugs, I should again like to add a word of caution about the use of sprays or topical pontocaine and cocaine, particularly keeping in mind the latent period of sensitization of one to four weeks. Serious reactions or fatalities may follow second usage (particularly of pontocaine). Skin testing should be done before using these drugs. The preliminary use of barbiturates and antihistaminics may minimize the extent of the reaction. Epinephrine and aminophyllin must be available for immediate administration. Finally, an aminophyllin infusion should be given prophylactically to all patients who are about to receive pontocaine or cocaine, for a second time within a one to four week period.

Supportive Therapy

The sick asthmatic presents a rather serious picture of total physiologic deprivation. Evidence of severe anoxia, cyanosis, dehydration, peripheral vascular shock and drug intoxication from intensive therapy may be present. He has been ill for some time and has lost a good deal of fluid and electrolytes. The first effort should be to replace this lost material. No fixed rules should be set up for the contents of this so-called "intravenous cocktail". It is generally my custom to begin by using 5 per cent glucose in saline for the first liter and 5 per cent glucose in distilled water for the second and third liters. The three liters may be given in twenty-four hours by employing a flow of approximately 30 drops per minute.

In the young patient, wherein the possibility of cor pulmonale and underlying heart disease does not present itself, one can safely give more saline solution. In the rare patient with a complicating cor pulmonale, the judicious use of a salt-free diet, distilled water in place of saline for the "infusion cocktail" and daily use of 2 cc. intramuscularly of one of the mercurial diuretics has been of life-saving value.

I have not been able to convince myself of the value of digitalis in most of these patients. The occasional patient appears to be helped but some are even further incapacitated.

Aminophyllin (theophylline ethylenediamine) in varying dosage may be added to the intravenous infusion. Theophylline has been demonstrated to release bronchial spasm and to lower the venous and intrathecal pressures. Patients vary in their tolerance to aminophyllin—some become alerted; others become drowsy; many become nauseous and may even vomit; and still others complain of palpitations and sweating. Syncope and peripheral vascular collapse may be observed if the injections are too rapid. Some of these reactions may be avoided by slowing the rate of flow. One may begin by adding 0.5 gm. of aminophyllin per liter of solution. The dose may then be adjusted lower or upward to 1 gm. per liter of solution depending upon the patient's ability to tolerate the drug. How long should one continue to use intravenous infusions? They may be run continuously for one day or longer. Goodall and Unger[28] have been able to relieve many severe attacks with continuous intravenous aminophyllin in glucose or saline solutions. I have continued them for as long as ten days. The duration should depend upon the patient's response and tolerance to aminophyllin. If improvement follows one or two days of continuous therapy, the intravenous infusions may then be given intermittently, e.g., from 9 a.m. to 9 p.m. daily, reducing the total

intake to 1500 cc. Supplementary aminophyllin, if necessary through the night, may be given in the form of a 20 cc. intravenous solution containing 0.25 or 0.50 gm. aminophyllin. This should be administered slowly at a rate not exceeding 2 cc. per minute. Intramuscular aminophyllin (2 cc. ampoule containing 0.5 gm.) has a very limited value clinically and furthermore, patients complain of pain during its administration and of residual soreness and "lumps".

The continuous or interrupted infusions may be omitted with evidence of complete freedom from severe paroxysms of coughing or bronchospasm. In their place, aminophyllin should then be administered rectally in dosage of 5 to 10 grains in 15 cc. of tap water every eight or twelve hours. This therapy, in gradually diminishing dosage, should be continued for at least one month after complete recovery.

In time, the rectal aminophyllin solution may be replaced with a tablet containing aminophyllin 0.2 gm., ephedrine sulfate 0.025 gm. (or suitable derivation) and phenobarbital 0.03 gm. administered upon arising and at 4 p.m. if indicated. The phenobarbital serves as an efficient sedative with a slow onset and prolonged action capable of offsetting the stimulatory effects of aminophyllin and ephedrine. A tablet containing aminophyllin 0.3 gm., ephedrine sulfate 0.04 gm., sodium pentobarbital 0.1 gm., and phenobarbital 0.06 gm., may be administered at bedtime for prompt and protracted hypnotic action.

Other therapeutic agents may be added to the "intravenous cocktail". Cevitamic acid in high dosage or cytochrome C may be given intravenously in the hope that they will increase the oxygen uptake from the blood plasma into the red cells themselves. However, I have not seen any striking results from their use, although I have given as much as 5000 mg. of cevitamic acid per liter of solution. The same holds for nicotinic acid intravenously. One may observe an extensive flush and perhaps some bronchial dilatation but no lasting effects. Furthermore, the side reactions of flushing, warmth and throbbing headaches are not well accepted by most patients, although they were forewarned of same. I should like to suggest avoiding the use of Vitamin B Complex preparations intravenously because of sensitization to thiamine chloride. If there is definite evidence of Vitamin B deficiency, they may be given intramuscularly.

On occasion, alcohol-dextrose solution may be given intravenously in place of the saline-dextrose infusions. Brown,[29] and Brown and Gillespie[30] have reported excellent results with infusions of 5 per cent ethyl alcohol in glucose or saline, with or without epinephrine in the solution. We have generally employed one liter

of 5 per cent ethyl-alcohol in 5 per cent glucose solutions free of vitamin supplements. When necessary, aminophyllin was added to this infusion. Flows of 80 to 120 drops per minute are generally necessary for relaxation. Excitement may follow too rapid rates and relaxation may occur with slow rates; this is due to excessive or inadequate cerebral blood levels respectively. We have occasionally seen striking relaxation when the mixture was given for the first or second time. As a rule, however, these effects did not persist with repeated use. The peripheral vasodilatory effects could be deleterious in the presence of peripheral vascular collapse and further limits the usefulness of this mixture.

We have observed in this series of cases, three instances of serious peripheral vascular collapse characterized by ashen-colored, cold and clammy skin, rapid and barely perceptible heart rate and dropping blood pressures. These patients were given blood plasma with very good effect. Two patients required two units respectively and the third patient received eight units in twenty-four hours before recovering from the profound shock. The sternal route had to be employed with the latter patient because of inability to locate the collapsed veins when death appeared imminent. Supplemental oxygen, intravenous neosynephrin, cevitamic acid and adrenal cortical extract were also employed in these patients and recovery was complete.

Epinephrine

Epinephrine has proven to be both a good antihistaminic and anticholinergic drug in experimentally induced dyspnea and bronchospasm in our laboratory. This drug has been employed in various modifications and concentrations and routes. No true idiosyncrasy (allergy) to epinephrine has been reported. However, toxic reactions, intolerance and fastness may occur. These effects are more commonly observed with overdosage and with repeated parenteral use. Deaths[22,31] have been reported following intravenous administration or accidental intravenous injection; these may have been due to epinephrine deposit in the heart muscle with ensuing ventricular tachycardia and fibrillation.[32]. Caution should be stressed about the possibility of accidents from the injection of 1:100 epinephrine and other concentrated sympathomimetic amines intended purely for aerosol use.

In general, epinephrine parenterally is limited in its value for the relief of the acute attack. The minimum dosage which will accomplish the desired effect is the best for it will also minimize the disagreeable side reactions. Unfortunately, few limit the dosage to the proper and effective subcutaneous injection of 0.2 to 0.3 cc. of 1:1000 dilution. Generally, larger doses at frequent intervals

are resorted to. Unfortunately, the use of the hypodermic injection, which should be avoided, is encouraged too otfen for self-medication. Habitual users of self-administered hypodermics of epinephrine become dependent upon this crutch. The despair of the disease is further contributed to by this dependency. The epinephrine-fast state is encountered most commonly in these patients. I have not observed any striking value from combinations of epinephrine 1:500 in various oil and gelatin vehicles employed for a slow release. Uncertainty of uniform absorption and action due to the sudden release of epinephrine, the side reactions, the residual soreness due to poorly resorbed tissue areas, and possible oil tumors limit its value. Most patients in status asthma are epinephrine-fast, and the use of all epinephrine preparations should be avoided for at least several days until epinephrine sensitivity is restored. I have made a rule of never adding epinephrine to the "intravenous cocktail" for these patients with status asthma.

The development of the epinephrine-fast state in the asthmatic subject is distressing to the patient and poorly understood by his physician. The delicate histamine-sympathin balance or seesaw is upset. Repeated injections of epinephrine no longer produce bronchial relaxation, but rather manifestations of toxicity—namely palpitations, tachycardia, headache, flushing, etc. Staub[33] and Farrerons-Co.[34] have demonstrated that epinephrine invokes the production or release of histamine in the experimental animal (probably as a homeostatic effort). Yonkman,[35] and Yonkman and Mohr[36] thought that these studies probably explained in part the mechanism involved in the potentiation of adrenergically controlled functions by antihistaminic agents, and, furthermore, that this histamine release could paradoxically contribute to further broncho-constriction, pulmonary edema and dyspnea. This sequence may be more evidenced in the allergic than in the normal subject. They suggested that antihistaminic preparations given intravenously could be of value in serving as histamine antagonists or epinephrine sparers in the epinephrine-resistive patient, thus balancing the delicate histamine-sympathin seesaw. These studies by Staub, Farrerons Co, and Yonkman and Mohr are of particular interest in view of our recent observations in two acutely ill patients in status asthma. A prompt restoration of epinephrine sensitivity followed the intravenous injection of 50 mgm. of an antihistaminic in both of these subjects.

The use of ephedrine preparations for the relief and prevention of asthmatic attacks has many limitations. They are or no value in the acutely ill patient. Side reactions, notably palpitation, headaches, jitteriness and insomnia, are quite common. In the

middle-aged male patient, urinary difficulties, particularly dysuria and diminution of the urinary stream, may appear. However, preparations employing 0.25 to 0.5 grains of ephedrine sulfate or similarly acting drugs combined with aminophyllin and sedative preparations are beneficial as supplementary therapy for the ambulatory patient. Several of the newer ephedrine-like synthetic drugs may cause less side reactions to occur. One of these preparations, Orthoxine (Upjohn), has been well tolerated in 200 mg. doses at four hour intervals and has appeared to help some patients.

Therapeutic Use of Gases

Oxygen should be employed for the relief of anoxia and cyanosis; helium and oxygen mixtures for the relief of respiratory obstruction; positive pressure inhalations of oxygen or helium and oxygen for the management of pulmonary edema; carbon dioxide mixtures as expectorants ("bronchial catharsis"); and aerosols of bronchodilator drugs for the relief of bronchospasm or antibiotic drugs for the control of infection.

1. *Oxygen and Helium-Oxygen Mixtures*

The inhalation of helium and oxygen mixtures[37-41] have relieved many patients who failed to respond to other recognized therapeutic measures. *The type of gas mixture used will depend upon the factors responsible for the dyspnea, whether hypoxia or respiratory obstruction.* If hypoxia is the main factor oxygen in adequate concentrations, employing equipment most suitable for the patient, should be administered.

Barach[42,43] has demonstrated that if respiratory obstruction exists, mixtures of 80 per cent helium and 20 per cent oxygen are more beneficial than oxygen alone. The percentages of the helium and oxygen mixtures can be controlled at will by using separate tanks of oxygen and 80 per cent helium with 20 per cent oxygen connected by a Y tube to the apparatus used. The greater the concentration of helium (66 to 80 per cent), the more effective the mixture in overcoming respiratory fatigue and dyspnea, provided that hypoxia is avoided.

It may be observed that positive pressure inhalation of oxygen or helium and oxygen will clear up signs of pulmonary edema promptly. The patient can be treated in the hood apparatus or positive pressure mask[41] intermittently for as many days as necessary. Positive pressure therapy should be intermittent and generally for one hour out of every four hours as the patient may find it tiring for longer periods. It is better tolerated in the hood apparatus.

2. *Carbon Dioxide-Oxygen and Carbon Dioxide-Helium-Oxygen Mixtures*

A dry, irritating, non-productive or poorly productive cough is frequently encountered in asthmatic subjects. Every attempt should be made to reduce the viscosity of the exudate by the usual expectorants or by the use of therapeutic aerosols, carbon-dioxide and oxygen mixtures, or carbon-dioxide and helium-oxygen mixtures.

Banyai,[44,45] Hollinger[46,47] and others have found inhalations of $C0_2$ and 0_2 superior in therapeutic action to expectorants. Inhalations of carbon-dioxide-oxygen mixtures should be employed only if the more conservative measures have failed and if there are no contra-indications particularly emphysema, to increasing the rate and depth of respirations, albeit for short periods of time. I have found mixtures of 5 per cent carbon-dioxide, 20 per cent oxygen and 75 per cent helium of particular value when employed to nebulize mixtures of 0.25 cc. of 1 per cent neosynefrin with 0.50 cc. of Vaponefrin or Isuprel, 1:200; this has been generally well tolerated. Each treatment should take five to ten minutes and should be interrupted frequently if the respirations become too strenuous. A harsh, useless, ineffective cough may be converted into a useful one that produces mucopurulent exudates.

3. *Therapeutic Aerosols*

Inhalation of nebulized sprays of various therapeutic agents may be employed for the relief of the troublesome cough as an aid to expectoration and for the control of infection. Aerosols of Vaponefrin, Isuprel 1:200 or Epinephrine 1:100 are of particular value for the relaxation of bronchospasm. Nebulization (with the hand bulb, continuous flow of oxygen or helium-oxygen, or air-pump (Fig. 3) of 0.5 to 1.0 cc. of these solutions generally overcomes the bronchospasm. It likewise often converts a useless cough, improves the vital capacity and permits deeper respirations. The combination of 0.5 cc. of Vaponefrin or Isuprel 1:200 and 0.5 cc. of 1 per cent neosynephrin is of particular value when there is bronchospasm, accompanied by sticky, tenacious sputum or a troublesome unproductive cough. Substituting helium and oxygen mixtures for oxygen is of further value if there is evidence of bronchial obstruction. The helium-oxygen mixture allows the nebulized solutions (Vaponefrin, neosynephrin, penicillin or streptomycin) to pass through contracted bronchi more freely and permits these preparations to act effectively on the mucosal and submucosal surfaces.

The sympathomimetic aerosols should be employed only when

specifically indicated and with well defined instructions to the patient and nurse. The proper inhalatory technique with the use of a small particle size nebulizer is most important. The preparations should be clearly labeled by name and concentration, and marked for *aerosol use only*. On occasion, they have accidentally been given parenterally with very disturbing side reactions. Excessive use should be firmly prohibited. The patient must be instructed not to swallow saliva during treatment, and to rinse his mouth thoroughly after each treatment. With overdosage, the usual side reactions observed with epinephrine may be seen. Finally, the patient should be taught to wait fully five minutes after one to three inhalations before repeating same.

Bronchial Evacuation—"Catharsis"

Evacuation of the bronchi may be accomplished by "bronchial catharsis," positional drainage, bronchoscopic aspiration and endoscopic lavage. Catharsis in the Freudian sense may be of value in the management of the sick asthmatic. In its physiologic significance, it is frequently of life-saving value. Bronchial catharsis may be accomplished in a variety of ways. The expectorant drugs (e.g., iodides[48]) may be considered bronchial evacuants. Ipecac is

FIGURE 3: AIR PUMP*

For the production of aerosols with the standard nebulizer technique (bronchodilator drugs), rebreathing technique (antibiotic drugs) and with venturi (positive and negative pressures for para-nasal sinus disease).

*Vaponefrin Company, Upper Darby, Pennsylvania.

probably the most effective agent that can be employed to promote bronchial evacuation.

Expectorant drugs play a very important role in the management of the sick asthmatic. The mucus in the bronchioles is usually tenacious and inspissated, due largely to dehydration and long residence because of ineffectual cough. Many expectorants and expectorant sedative mixtures have been employed, the most commonly employed being the iodides and ammonium chloride. I have never been certain of any benefit from compound tincture of benzoin and prefer the volatile oils of anise, pine and eucalyptus in steam for their expectorant action.

I have found ipecac of considerable value in the management of various stages of bronchial asthma in adults. The patient should be able to withstand the retching associated with reverse peristalsis. *Ipecac acts by substituting effective retching in the place of ineffective coughing.* It is always worth a trial before attempting bronchoscopy. Once the "tracheal vomiting" (Reinberg[49] and Ratner[50]) has started, positional drainage aids in eliminating the loosened secretions. Relief is often striking, particularly in the chronically ill and in patients with flabby musculature and low diaphragms. The patient should be informed about the effects of this bronchial purge. The syrup of ipecac may be administered in 2 or 3 teaspoonful doses followed by a cup of luke-warm boiled water. This dose may be repeated several days later if indicated.

Endoscopic Therapy

Endoscopic therapy (bronchoscopy, bronchoscopic aspiration, endoscopic instillations of iodized penicillin and streptomycin suspensions, and bronchial lavage) plays an important role in the prevention and relief of bronchial obstruction and in the control of infection. It thus prevents the serious sequellae of obstructive emphysema, segmental atelectasis and bronchiectasis.

Bronchoscopy

Bronchoscopy is a very valuable diagnostic and therapeutic procedure and is indicated whenever a harsh, useless cough, with dammed-up secretions is present and bronchospasm persists despite adequate physiologic management. Thick tenacious suputm may be removed, large amounts of the thinner secretions aspirated, and bronchial drainage facilitated.

One of the most common and important causes of death in asthma is obstruction of the larger and smaller air passages by inspissation of tenacious secretions. At times spectacular results

may be observed following bronchoscopic aspiration in moribund patients.

Waldbott[51] has stressed the value of bronchoscopic aspiration and lavage of the bronchial tree with saline solution in severe attacks. Having witnessed one death and two near fatalities with the use of pontocaine and cocaine sprays and instillations for local anesthesia in asthmatic subjects, I generally prefer deep surgical anesthesia. Vinethene (divinyl ether), employed as a preliminary induction agent to ether, permits a smoother and more rapid induction which is generally free of laryngeal irritation or spasm. The bronchoscopist or anesthetist should flood the airway with oxygen during anesthesia and bronchoscopy. With this technique, intensive bronchoscopic aspiration, including culture and stain of the secretions, followed by bronchial lavage with saline solution, and finally, instillation of a solution of penicillin and/or streptomycin in neosynephrin may prove of life-saving value to the asthmatic subject.

Aspiration of retained bronchial secretions should follow bronchoscopy. Proper bronchoscopic aspiration is usually followed by marked subjective and objective improvement, because it establishes drainage and rids the bronchi of the accumulated secretions. Removal of the bronchial obstruction may prevent or relieve the possible serious sequellae referred to previously.

Endotracheal Instillations

Although the introduction of radiopaque preparations into the tracheo-bronchial tree is essentially a diagnostic procedure, it can be utilized as an effective therapeutic[52-55] medium. The iodine in the oils is relatively inert and has little or no antiseptic value. However, by mixing with or displacing the pocketed secretions, the instillations mechanically help the patient in cleansing the bronchial tubes, thereby assisting expectoration and subsequent postural drainage. Occasional intrabronchial instillations of suspensions or solutions of penicillin or streptomycin, or both (depending upon the organisms present) in one of the iodine preparations may be of tremendous supplementary value to penicillin aerosol therapy.

In several patients who were producing a great deal of purulent secretions, bronchoscopic aspiration, followed by bronchoscopic instillation of 250,000 units of penicillin and 0.5 grams (500,000 units) of streptomycin in 20.0 cc. of Pantopaque was carried out just at the outset of penicillin-aerosol therapy and, on occasion, repeated at weekly intervals if evidence of obstruction and/or infection persisted. We have occasionally mixed penicillin and streptomycin with 1 cc. of 1 per cent neosynephrine and 0.20 cc.

of Vaponefrin or Isuprel 1:200 in 10 to 20 cc. of pantopaque. The mixture was then instilled directly into both lungs through the bronchoscopy. This combination leads to dilution of the sputum and loss of its tenacious mucoid character, thus lessening the necessary effort for expectoration. Patients generally tolerate this procedure very well and feel considerably relieved after evacuating large amounts of secretions and inspissated pus that they previously had been unable to evacuate. The neosynephrin, acting as a vasoconstrictor, and the Vaponefrin or Isuprel acting as a broncho-dilator, provide a more patent airway. The latter also prevents any bronchospasm that might occur following instrumentation and topical anesthesia. The pantopaque solution further helps in cleansing the bronchi and bronchioles of tenacious secretions which have become adherent to the mucosal walls. Furthermore, since the solution is an aqueous one, it does not cling to the bronchial mucosa and hence does not interfere with the action of the penicillin.

Intratracheal Penicillin

Intratracheal penicillin has proven to be of greater value than intramuscular penicillin in the treatment of chronic bronchitis, bronchiectasis and lung abscess.[52,55] We have been unable to demonstrate any penicillin in the sputum of patients with suppurative lung disease following intramuscular penicillin.[55] On the other hand, we have been able to demonstrate high sputum levels in the same patients following aerosol and endoscopic instillations.[52] In normal subjects, we have also demonstrated adequate penicillin blood levels which persist for a longer period than those following intramuscular injections. These levels were highest when neosynephrin and pantopaque were employed as diluents in place of saline.

The intratracheal technique is simpler than the intrabronchial one, which requires bronchoscopy. However, I prefer the latter in patients with asthma because diagnostic assistance and proper aspiration prior to each instillation can be obtained. Cleaning the bronchi of tenacious secretions by aspiration further insures a concentrated topical effect for the antibiotic. If atelectasis occurs, this procedure should be repeated even more assiduously.

Bronchial Lavage

Penicillin in normal saline solution, sodium sulfathiazole solutions or physiologic saline solutions may be used for bronchial lavage.[56] Although the principle of irrigation of an affected area may appear surgically sound, nevertheless, the procedure is not without danger, for reinfection, new infection or spread of infection

to involved areas may occur. Finally, the possibility of sensitization to pontocaine (preliminary local anesthetic) with repeated usage should be borne in mind.

Management of Infection in Bronchial Asthma

The role of pathogenic and nonpathogenic bacteria, molds and viruses in bronchial asthma continues to be a debated issue.[57-59] Whether or not infection acts as a primary excitant, it is certain that infection is important in producing asthma.

Adequate levels of sulfonamides and antibiotics[60-65] in the sputum, the tracheobronchial tree and the pulmonary tissues should be the primary aim in management. In general,[66,67] we have found penicillin aerosol disappointing in patients with so-called chronic infectious bronchial asthma, although striking improvement may be occasionally observed. Most of the patients observed, however, that they were able to raise sputum more easily while receiving the penicillin aerosol. The danger of local or generalized allergic reaction must always be kept in mind.

Paranasal sinus disease is responsible for the reinfection and recurrence of cough and wheezing in patients with bronchial asthma. These patients are more likely to have serious asthma, and irreparable sino-bronchitic disease. Treatment should consist of the combined use of antihistaminic preparations and nasal penicillin therapy with the technique of intermittent negative pressure and replacement with penicillin aerosol,[68,69] with judicious but minimal surgical assistance. Allergy is the dominant factor in the maintenance of chronic paranasal sinus disease in the asthmatic.

DISCUSSION

In the severe, persistent acute attack or in the continuous state of status asthmaticus, the patient presents a rather serious picture of total physiologic inbalance. Evidence of severe anoxia, cyanosis, dehydration, peripheral vascular shock and drug intoxication from intensive therapy may be present. Death may come suddenly from any of the latter factors, but more commonly is due to the asphyxia resulting from the plugged and obliterated bronchi and bronchioles.

Management of the patient should be based upon the understanding of all the participating forces and their relative values. Correlation of protection studies in the laboratory with clinical experience opens up avenues not possible for complete discussion at this time. The combination of a good antihistaminic and a good anticholinergic drugs with bronchospasmolytic properties should be the ideal therapeutic agent in bronchial asthma. Two drugs, aminophyllin and epinephrine, approach this idea. However, both have certain limitations. We are hopeful of determining a more

effective combination of agents than either of these drugs alone.

The physician must acquire a calm serenity and develop endless patience. The patient must have continuous reassurance without sacrifice of a determined positive approach on the part of his physician. This requires the continuous education of the patient and his family. I know of no other disease which can tax the character and scientific skill of the physician as much as the proper management of the very sick asthmatic.

SUMMARY

1) In order to restore physiologic balance in the sick asthmatic, it is necessary to maintain a therapeutic balance. I have attempted to illustrate the various measures which are necessary to balance this therapeutic seesaw.

2) The therapeutic measures suggested are based largely on personal experiences in the management of 513 patients and have been correlated with extensive laboratory studies with a large variety of protecting drugs, employing a method of human assay (protection studies).

3) With this technique, a method of human assay of the relative value of new and accepted therapeutic agents for the relief of bronchial asthma is possible. This technique has afforded us the opportunity of making these studies under controlled conditions usually not present in the sick patient. A comparative study of the protective abilities of several bronchodilators against the effects of intravenous histamine and mecholyl-induced dyspnea and bronchospasm is presented. The role and limitations of epinephrine, aminophyllin and the antihistaminic preparations based on laboratory and clinical correlation is discussed.

4) The role of sedation with drugs and anesthetic agents is presented. The use of chloral hydrate and sodium bromide, demerol, demerol and scopolamine (a modified form of "twilight sleep"), ether and paraldehyde, and caution about the use of sprays or topical pontocaine and cocaine is discussed.

5) Supportive therapy including the replacement of water, glucose, electrolytes and blood plasma is discussed at length. There should be no standard "intravenous cocktail mixture". It should be prescribed according to physiologic needs. Interrupted or continuous intravenouses containing aminophyllin may be of great value. Addition of Cytochrome-C, nicotinic acid, vitamin B. Complex or cevitamic acid to the infusion fluid has not proven of striking value. On occasion, relaxation followed the use of alcohol-dextrose solution in place of the saline-dextrose infusions. These effects, however, did not persist with repeated use.

6) The therapeutic use of gases is discussed: oxygen for the

relief of anoxia and cyanosis; helium and oxygen mixtures for the relief of respiratory obstruction; positive pressure inhalations of oxygen or helium and oxygen for the management of pulmonary edema; carbon dioxide mixtures as expectorants ("bronchial catharsis"); and aerosols of bronchodilator drugs for the relief of bronchospasm or antibiotic drugs for the control of infection.

7) Considerable emphasis is placed on the value of bronchial evacuation. Evacuation of the bronchi may be accomplished by "bronchial catharsis," positional drainage, bronchoscopic aspiration and endoscopic lavage. "Bronchial catharsis" in its physiologic sense can be observed with the use of expectorant drugs (e.g., iodides) and syrup of ipecac. Ipecac acts by substituting effective retching for ineffective coughing.

8) The role of infection in bronchial asthma and its management is discussed. Adequate levels of sulfonamides and antibiotics in the sputum, the tracheobronchial tree and the pulmonary tissues should be the primary aim in management. We have been unable to demonstrate any penicillin in the sputum of patients with suppurative lung disease following intramuscular penicillin. On the other hand, we have been able to demonstrate high sputum levels in the same patients following aerosol and endoscopic instillations. In normal subjects, we have also demonstrated adequate penicillin blood levels which persist for a longer period than those following intramuscular injection. These levels were highest when neosynefrin and pantopaque were employed as diluents in place of saline.

9) Paranasal sinus disease is responsible for the reinfection and recurrence of cough and wheezing in patients with bronchial asthma. These patients are more likely to have serious asthma and irreparable sino-bronchitic disease. Treatment should consist of the combined use of antihistaminic preparations and nasal penicillin therapy with the technique of intermittent negative pressure and replacement with penicillin aerosol, with judicious but minimal surgical assistance.

10) The antihistaminics although generally of limited value in the management of the asthmatic subject, may be of considerable value in the following: Orally for the relief of paranasal obstruction (allergy is the dominant factor in the maintenance of chronic paranasal sinus disease in the asthmatic); intravenously to restore the delicate histamine-sympathin balance in the epinephrine refractory state; and for sedative effects in the status state.

RESUMEN

1) A fin de restaurar el balance fisiológico en el asmático enfermo es necesario mantener un balance terapéutico. He tratado

de ilustrar las varias medidas que son necesarias para balancear este vaivén terapéutico.

2) Las medidas terapéuticas que se sugieren están basadas en gran parte en la experiencia personal obtenida en el tratamiento de 513 casos y han sido correlacionados con extensos estudios de laboratorio con una gran variedad de drogas protectoras, empleando el método de ensayo humano (estudios de protección).

3) Con esta técnica es posible desarrollar un método de ensayo humano del valor relativo de agentes terapéuticos, tanto nuevos como aceptados, para el alivio del asma bronquial. Esta técnica nos ha dado la oportunidad de hacer estos estudios bajo condiciones comprobadas, que generalmente no existen en el caso del enfermo. Se presenta un estudio comprobado de la habilidad protectora de varios broncodilatadores contra los efectos de la disnea y el broncoespasmo causados por la inyección intravenosa de histamina y mecolil. A base de correlaciones clínicas y de laboratorio, se discute el papel y las limitaciones de la espinefrina, la aminofilina y las preparaciones antihistamínicas.

4) Se presenta el papel de la sedación con drogas y agentes anestésicos. Se discute el empleo del hidrato de cloral y el bromuro de sodio, del demerol, del demerol y la escopolamina (una forma modificada del "medio sueño"), del éter y el paraldehido y se cauciona acerca del uso de rocíos o la aplicación tópica de la pontocaína y la cocaína.

5) Se discute a lo largo la terapia sutentante, inclusiva de la restitución de agua, glucosa, electrolitos y plasma sanguínea. No debe existir un "cocktail intravenoso" típico. Debe recetarse de acuerdo con la necesidad fisiológica. Las infusiones intravenosas, interrumpidas o contínuas, que contengan aminofilina pueden ser de gran valor. La adición al líquido de la infusión de Citocromo-C, ácido nicotínico, complejo vitamínico B o ácido cevitámico no ha demostrado ser de gran valor. Ocasionalmente se obtuvo dilatación mediante el empleo de una solución de alcohol y dextrosa en vez de las infusiones de salina y dextrosa. Sin embargo, con el uso repetido, no persistieron estos efectos.

6) Se discute el empleo terapéutico de gases: oxígeno para el alivio de anoxia y cianosis; mezclas de helio y oxigeno para el alivio de obstrucción respiratoria; inhalaciones de oxígeno o de helio y oxígeno bajo presión positiva para el tratamiento del edema pulmonar; mezclas de bióxido de carbono como expectorantes ("purga bronquial"); y aerosoles de drogas broncodilatadoras para el alivio de broncoespasmo o drogas antibióticas para combatir la infección.

7) Se ha hecho considerable hincapié sobre el valor de la eva-

cuación bronquial. Se puede obtener la evacuación de los bronquios mediante la "purga bronquial," la canalización por postura, la aspiración broncoscópica y el lavado endoscópico. En su sentido fisiológico se puede obtener la "purga bronquial" mediante el empleo de drogas expectorantes (por ejemplo, los yoduros) y el sirope de ipecacuana. La ipecacuana actúa por la substitución de los esfuerzos vómicos eficaces por la tos ineficaz.

8) Se discute el papel que desempeña la infección en el asma bronquial y su tratamiento. El objeto primordial del tratamiento debe ser el obtener niveles adecuados de sulfonamidas y antibióticos en el esputo, el árbol tráqueobronquial y los tejidos pulmonares. No hemos podido demostrar ninguna penicilina en el esputo de pacientes con enfermedades supuradas de los pulmones después de la administración intramuscular de la droga. Por el contrario, sí hemos podido demostrar elevados niveles en el esputo de los mismos pacientes después de la inhalación de aerosoles o instilaciones endoscópicas. En sujetos normales también hemos demostrado adecuados niveles sanguíneos de penicilina que persisten por un período más largo que los que siguen a la inyección intramuscular. Estos niveles fueron máximos cuando se empleó neosinefrina o pantopaco como diluentes en vez de salina.

9) La infección de los senos paranasales es responsable por la reinfección y reaparición de tos y respiración difícil en pacientes con asma bronquial. En estos pacientes es más común el asma grave y la enfermedad seno-bronquítica irreparable. El tratamiento debe consistir del uso combinado de preparaciones antihistamínicas y de la terapia nasal con penicilina, usando la técnica de presión negativa intermitente y reemplazo con aerosol de penicilina, y de una sensata y mínima asistencia quirúrgica.

10) Las drogas antihistamínicas, aunque generalmente de valor limitado en el tratamiento del sujeto asmático, pueden tener considerable valor en los casos siguientes: por la vía oral para el alivio de obstrucción paranasal (la alergia es el factor dominante en el mantenimiento de infección crónica de los senos paranasales en el asmático); por la vía intravenosa para restaurar el delicado balance histamino-simpatino en el estado refractorio a la epinefrina; y por los efectos calmantes en el status asmaticus.

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Discussion

GEORGE L. WALDBOTT, M.D.
Detroit, Michigan

In discussing this instructive paper on treatment of asthma, I wish to confine myself to one point which I believe is most important to chest physicians, namely, bronchoscopic lavage. One of my patients with chronic asthma had become progressively worse in spite of the application of most known therapeutic measures. While he was in an extremely critical stage, I called in one of our leading bronchoscopists to have him aspirate the mucous plugs of which there had been evidence and, which he had ceased to expectorate. The surgeon refused to do a bronchoscopy because of the risk involved. A second surgeon was persuaded to undertake it, but upon re-examining the patient he too decided against it because of the hopelessness of the situation

and the possible risk involved. A third consultant refused when he was given the details of the case. A fourth chest surgeon finally inserted a bronchoscope and removed about 120 cc. of thick, gluey material, whereupon the patient promptly recovered: his pulse became palpable, the cyanosis disappeared, he became conscious, and on the following day he could leave the hospital. This story is typical. It demonstrates the dramatic result from bronchoscopic lavage and the reluctance of chest surgeons to perform it.

The rationale for this treatment is based on the following: Through the antigen-antibody, reaction, histamine is formed which produces bronchospasm and an increase in mucous secretion. If the asthma persists the mucus thickens—as it does in the sinuses and in the nose in hay fever,—it becomes infected, glue-like and so adherant to the wall that the relaxation of the bronchi produced by aminophyllin no longer suffices to release it. This mucus acts as a check valve through which air enters but becomes trapped on expiration, similar to the presence of a foreign body.

In practice, there are five indications for bronchoscopic lavage: First, as a life saving procedure in a moribund patient. I have observed nine cases of dramatic recovery from an extreme condition similar to the one quoted. In every one a large amount of mucus was removed. In one of these patients with periodic attacks of great severity which occurred during her menstrual periods, bronchoscopic lavage promptly relieved the attacks. On several occasions it had been life saving. Once the bronchoscopist was not available immediately upon admission of the patient to the hospital and she expired. The second indication is to break up a chronic state of asthma, regardless of its severity. In 152 bronchoscopies, 50, or one-third, were followed by improvement; in eight, a single bronchoscopy produced complete relief. The third indication is to remove a mucous plug causing atelectasis of a small pulmonary area or a whole lobe. A fourth reason for bronchoscopic lavage is the dilatation of a bronchial stricture. In this series there were three patients exhibiting this condition. The effect of dilatation cleared up persistent asthma of long standing. The fifth condition requiring bronchoscopic lavage is the removal of mucus resulting from bronchiectasis.

Bronchoscopic lavage should not be carried out if there is no evidence of mucus, namely, a) in asthma of short duration; b) in allergic bronchitis, where petechial hemorrhages and urticaria-like edema are present in the bronchial mucosa; c) in sudden allergic shock due to ingestion or inhalation of antigens to which extreme sensitivity exists.

There are hazards in bronchoscopy which justify to some extent

the reluctance of bronchoscopists to perform it. There is sensitivity to, and intolerance of, local anesthetics. Sensitivity is characterized by an unusual degree of edema at the area where the anesthetic is applied and by dyspnea. It may give rise to most serious complications and death. It can be controlled by large doses of epinephrin, by intravenous aminophyllin and intravenous antihistaminics. Intolerance to anesthetics is suggested by muscular twitching, nervousness, sensation of heat, and, finally, convulsions. Here, intravenous pontacain may be applied as an antidote. In addition, there may be sensitivity and intolerance to pre-operative drugs, particularly to opiates. Even Demerol and Pantopon which I formerly considered harmless have given rise to serious accidents. Patients may be sensitive to many other medications which had been, and still are being, applied intrabronchially, such as argyrol, diluted phenol solution, pontocain, sulfathiazole solution, penicillin and streptomycin. Severe dyspnea sometimes is noted after bronchoscopy if the mucus has been loosened but not thoroughly removed. In this emergency, one should be prepared to reintroduce the bronchoscope.

As to the technique, local and general anesthetics should be avoided if at all possible. Aminophyllin should be given intravenously before and, if necessary, during bronchoscopy. Small doses of epinephrin (1/10 cc.) given subcutaneously may aid in the relaxation of the bronchi. Penicillin may be introduced into the bronchi only after it has been ascertained that the patient is not sensitive to it.

Bronchoscopy in extremely severe asthma is as obligatory a procedure as the removal of a foreign body from the bronchi or a tracheotomy in diphtheria.

Discussion

ALVAN L. BARACH, M.D., F.C.C.P.
New York, New York

I think you all have been as much stimulated as I have by the comprehensive and brilliant discussion of Dr. Segal. I have nothing to say in disagreement with anything he has presented.

I would like to confirm most of what Dr. Waldbott has said. Bronchoscopic aspiration is, to my mind, one of the most important methods of converting the patient with status asthma or intractable asthma into a patient with a remission. I never use local anesthetic in these patients. I believing in employing ether anesthesia in all; it is entirely safe in my experience and can

often be done in the patient's room. I have seen many patients of the type described by Dr. Waldbott, who looked as if they were going to die, and following bronchoscopic aspiration recovery took place. It is also true that in a certain number of patients, one or two or sometimes three rectal instillations of 125 cc. of ether with olive oil will be followed by a remission.

Demeral to my mind is a most helpful drug in aiding to eliminate the intractable asthmatic state. We have used it in something over 500 patients and I have never seen any ill effects from its use, unless combined with overdosage of barbiturates. It is a bronchodilator. Dr. Segal has shown you some of the studies on protection. The most important thing to bear in mind in these cases is that there must be a period of time, four or five days or a week, in which cessation of all bronchodilator medication of the type of epinephrin, ephedrine and aminophyllin is carried out. These patients often get into a vicious cycle of taking more and more of these drugs, and unless they are stopped for a period the vicious state will continue. One of the advantages of bronchoscopic aspiration is that one may then stop the bronchodilator drugs. During the period in which this medication is stopped it is often helpful to use various forms of inhalation therapy. One cannot allow the patient to gasp for breath, but a combination of demeral and oxygen may tide him over for four or five days during which time no other drugs are used. Following that one frequently sees a restoration of sensitiveness to these bronchodilator drugs. Aminophyllin, although a brilliant and important remedy, may perpetuate recurring sieges of asthma if not stopped when the time comes when it is giving diminishing returns. I feel there are very few contraindications to bronchoscopy under ether. I do agree that there is no point in doing it if a patient has a dry cough, but for aspiration of retained mucus it is indicated. I have seen secretions removed that must have been present for a long time on the bronchial mucous membrane.

Closing Remarks

Maurice S. Segal, M.D., F.C.C.P.: I am very grateful to both Dr. Barach and Dr. Woldbott for stating so clearly their views on the value of bronchoscopy. Fortunately, I happen to work in Boston, where bronchoscopists are capable and numerous, and are usually willing to perform the procedure. One patient recently, for all practical purposes, was dead prior to bronchoscopy. I am sure we have saved life on more than one occasion.

I want to emphasize the type of atelectasis we usually see in our very sick patients with bronchial asthma. We do not see the type of massive atelectasis that Dr. Waldbott showed you. We do see

segmental atelectasis, and in several instances at least, we have felt it had gone on to bronchiectasis because of lack of proper management. I want to stress again the role of "catharsis" in treatment of bronchial asthma both in its psychic and in its somatic sense.

In conclusion, there are still many more fancies than facts, and even differences of opinion about the facts, in treatment of bronchial asthma.

The Clinical Significance of Pulmonary Hemorrhage: A Study of 1316 Patients with Chest Disease*

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Atlanta, Georgia

The purpose of this communication has been to try to evaluate the clinical significance of hemoptysis, to show its frequency of occurrence in pathological lesions of the thoracic cavity, and to evaluate the diagnostic measures which we now have at hand relative to the symptom of pulmonary hemorrhage. Since the advent of safe thoracic surgery the challenge towards more accurate diagnosis of the cause of pulmonary bleeding has been thrust upon us. Many of our previous concepts of the clinical significance of thoracic symptomatology should now be brought up for statistical evaluation, and some will then need actual revision. The possibility of a prevalent misconception in regard to pulmonary bleeding has instigated this study. In the decade prior to 1940 this symptom was considered presumptive evidence of pulmonary tuberculosis, and even today many nontuberculous patients are being sent to tuberculosis sanatoria because of this symptom alone. Too frequently the bronchiectatic describes a fruitless stay in a sanatorium. In 1936 Wientzen and Sjorslev[1] noted that only 582 of 869 patients admitted to a sanatorium because of hemoptysis actually had pulmonary tuberculosis. Andosca and Foley[2] in 1942 stated that carcinoma of the lung was the most common cause of pulmonary bleeding in people past the age of 45 years. They stressed the influence of age; in the group from 20 to 40 years, they noted tuberculosis to be the leading cause, followed by bronchiectasis and mitral stenosis; while the sequence after the age of 40 years becomes first, carcinoma; second, tuberculosis; and third, bronchiectasis. In 1942 Jackson and Diamond[3] described 436 patients with hemorrhage of nontuberculous origin. Tabulation of the causes of such bleeding showed: (See table on next page).

They noted that 140 of the patients presented a normal appearing plain chest x-ray film. The site of bleeding was visualized at bronchoscopy in 109 of the 436 patients. The 34 cases showing no

*From the Department of Surgery, Emory University Medical School. Presented at the 13th Annual Meeting, American College of Chest Physicians, Atlantic City, New Jersey, June 8, 1947.

Bronchiectasis	138 cases
Carcinoma	82 cases
Tracheobronchitis	74 cases
Pulmonary abscess	51 cases
No evidence of disease	34 cases
Bronchial adenoma	11 cases
Miscellaneous causes	46 cases

evidence of disease and the foregoing statements emphasizes our diagnostic limitations. Despite the emphasis placed by these authors upon the protean causes of pulmonary hemorrhage, one constantly encounters faulty conceptions of the clinical significance of this symptom in the overall picture of thoracic disease. Much of our study lends emphasis to the statements of the three aforementioned communications, but that alone would be justification for this presentation.

The data on 1,316 patients, who have been brought to the attention of a thoracic surgeon, has been reviewed. Figure 1 is a list, in detail, with the order of frequency of appearance of the various lesions which were encountered in this series. This group is not

FIGURE 1

DISEASES ENCOUNTERED IN 1316 CASES PRESENTED

Tuberculosis	302	Bronchial Asthma	5
Bronchiectasis	239	Bronchial Ulcer	5
Bronchogenic Carcinoma	187	Atelectasis	5
Mediastinal Tumors	70	Osteomyelitis of Rib	4
Lung Abscess	65	Mediastinitis	4
Traumatic Chest Wounds	64	Bronchial Stricture	3
Empyema	53	Spontaneous Thrombosis Superior Vena Cava	3
Cardiac Disease	40	Pericarditis	3
Metastatic Carcinoma	25	Pulmonary Emphysema	3
Pulmonary Infaction	25	Pneumatocele	3
Chronic Bronchitis	23	Silicosis	3
Esophageal Obstruction	22	Functional Dyspnea	2
Hemoptysis *(Undetermined Etiology)*	19	Bronchogenic Cysts	2
Congenital Cysts	19	Agenesis of Lung	2
Non-Specific Pneumonitis	16	Bronchial Endometriosis	2
Aneurysms	14	Broncholith	2
Diaphragmatic Hernia	13	Lipoid Pneumonitis	2
Fungus Disease	9	Floating Rib Syndrome	2
Sinusitis	8	Eventration of Diaphragm	1
Cardiospasm	8	Hamartoma	1
Tumor of Chest Wall	8	Hematoma of Lung	1
Bronchial Adenoma	7	Endobronchial Polyp	1
Diverticulum of Esophagus	5	Shrapnel in the Heart	1
Diseases other than Thoracic	5	Myasthema Gravis	1
Foreign Body	5	Sarcoma of Pleura	1

necessarily comparable to that seen by the internist, who sees a much larger percentage of patients with pulmonary bleeding associated with mitral stenosis, pulmonary and systemic hypertension. We have purposely omitted cases of hemoptysis occuring only in association with the "prune juice" sputum of lobar pneumonia. Emphasis in this study is laid upon the patient having hemoptysis as a symptom of chronic intrathoracic disease. It is justified at this point to stress the potential significance of unusual or prolonged hemoptysis in patients diagnosed as having "acute pneumonia." Although other symptoms usually have been present, not infrequently does surrounding pulmonary infection cause the first visit of the patient with bronchogenic carcinoma to his physician. Just as delay in the resolution of the x-ray shadow following pneumonia may arouse suspicion of carcinoma, prolonged or recurrent hemoptysis in "acute pneumonia" has been found worthy of investigation and may reveal associated neoplasm.

The event of the coughing up of blood is not necessarily related to the physician unless specific inquiry is made. This is especially true of patients with bronchiectasis who have had slight streak-

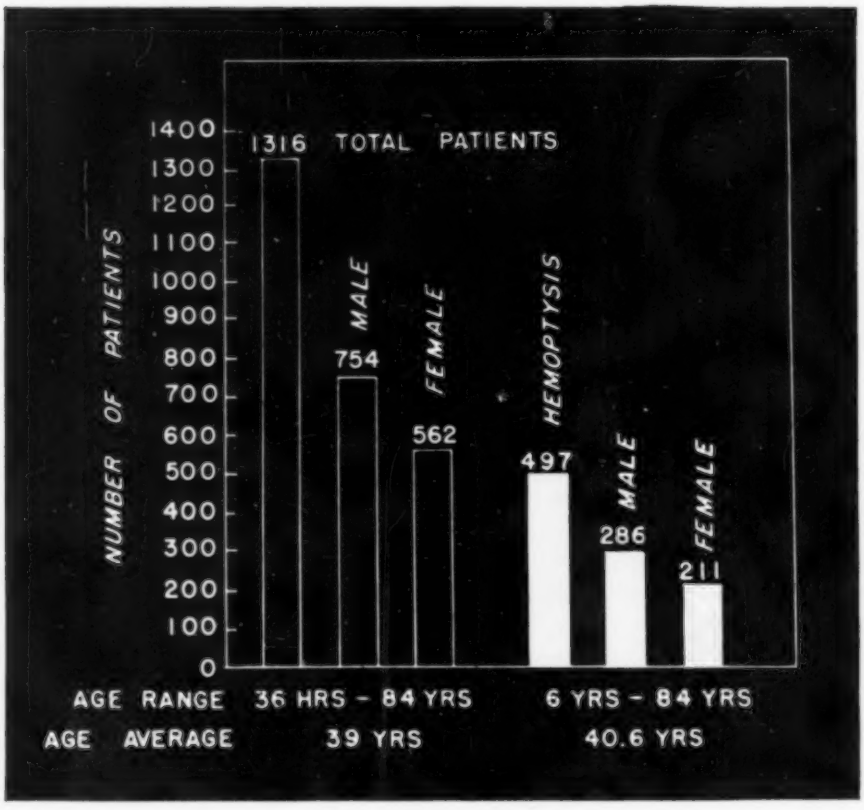

FIGURE 2

ing or even more active bleeding for so many years that it is no longer a matter of alarm. Also it is necessary to remember that some patients, especially children, may swallow the sputum and thus not note the presence of blood.

We are all familiar with the confusion caused by diseases of the upper respiratory tract which may cause bleeding of sufficient extent for the blood to enter the bronchial tree. Assiduous attention to this area as a possible site of bleeding in patients complaining of the coughing up of blood must be maintained. However, much unnecessary delay in the diagnosis and treatment of pulmonary disease has occurred when hemoptysis has been carelessly explained away as being due to bleeding from the upper respiratory tract without adequate investigation and proof.

The Statistical Study of the Significance of Hemoptysis

This series of 1,316 cases has been made up of patients covering a group from 7 years to 87 years of age (Fig. 2). The average

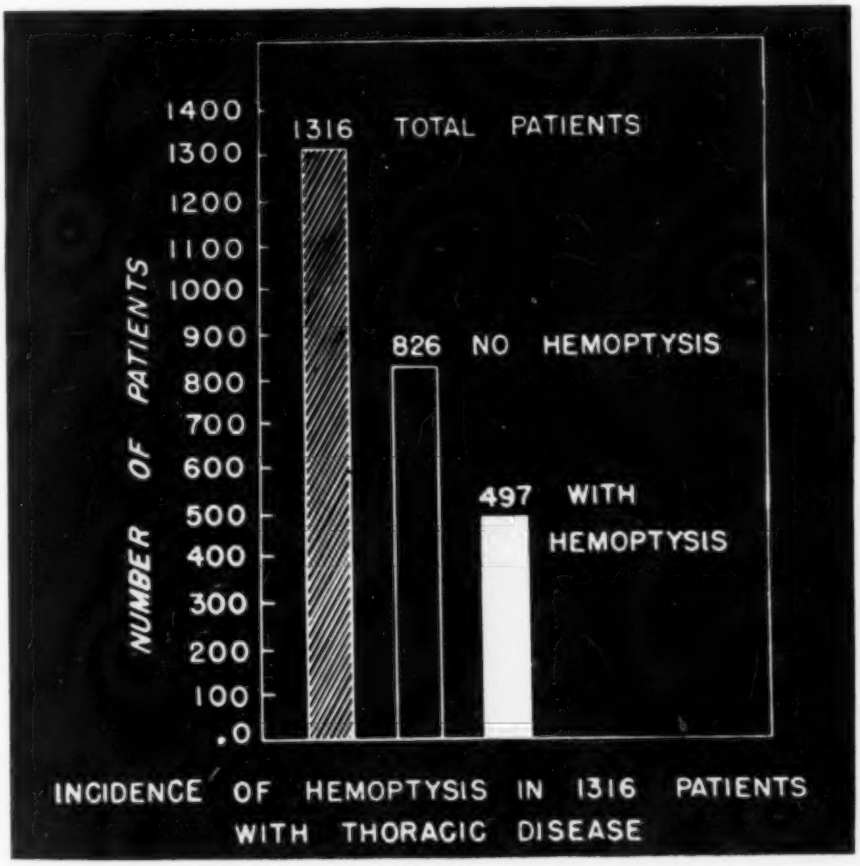

FIGURE 3

age of the entire group is 39 years. The sex incidence constitutes 55 per cent male and 45 per cent female. Of the 1,316 cases, 497 gave a history of bleeding from the lung, or 38 per cent of the entire group (Fig. 3). This group of cases describing hemoptysis, subdivided as to sex, is shown to be 56 per cent male and 44 per cent female, and is essentially equivalent to the sex incidence of the entire series.

Of the bleeding which occurred, the term "streaking" is self-explanatory. This was seen in 33 per cent of the cases relating pulmonary bleeding (Fig. 4). Sixty-seven per cent of those having hemoptysis brought up sputum which they described as being pure blood in varying amounts. No important correlation can be made between the type of hemoptysis and the underlying disease entity. An attempt was made to correlate the incidence of bleeding with the involvement of individual pulmonary lobes. Inasmuch as many of the cases had bilateral disease, there was a certain

FIGURE 4

	Patients
Frank Hemoptysis	318
Scant or Streaking	174
Degree Undetermined	5
TOTAL	497

FIGURE 5

LOCATION OF BLEEDING SITE

	Patients		Patients
Rt. Upper Lobe	63	Lt. Upper Lobe	82
Rt. Middle Lobe	30	*(Lingula 20)*	
Rt. Lower Lobe	75	Lt. Lower Lobe	92
"Right Lung"	49	"Left Lung"	38
TOTAL	217	TOTAL	212

FIGURE 6

LOCATION OF DISEASE

	Patients
Right Lung	217
Left Lung	212
Bilateral	74
Carina	2
Mediastinum	14
TOTAL	519

proportion in which the actual localization of the bleeding could not be determined; so that the total location of lesions, of necessity, represents a greater number than the total number of patients presenting a history of hemoptysis. Localization of the lesions is outlined in Figures 5 and 6. This tabulation shows no greater preponderance of hemoptysis-producing lesions in either lung or in individual lobes. However, it has been our experience in patients having normal appearing plain x-ray films of the chest to find the site of origin most commonly in the right middle lobe or in the lingula of the left upper lobe. These lesions have been in the main localized bronchiectasis or small abscesses. No explanation for the predeliction of these areas as sites of such disease is suggested.

It was also of interest to note the relationship of hemorrhage to the time of onset of symptoms in chest disease. The gradual and insidious onset of symptoms has made it difficult to individualize the first symptom in many patients. We have been impressed with the early onset of fatigue and weakness as an initial symptom of chronic pulmonary suppuration and tumor; but because of

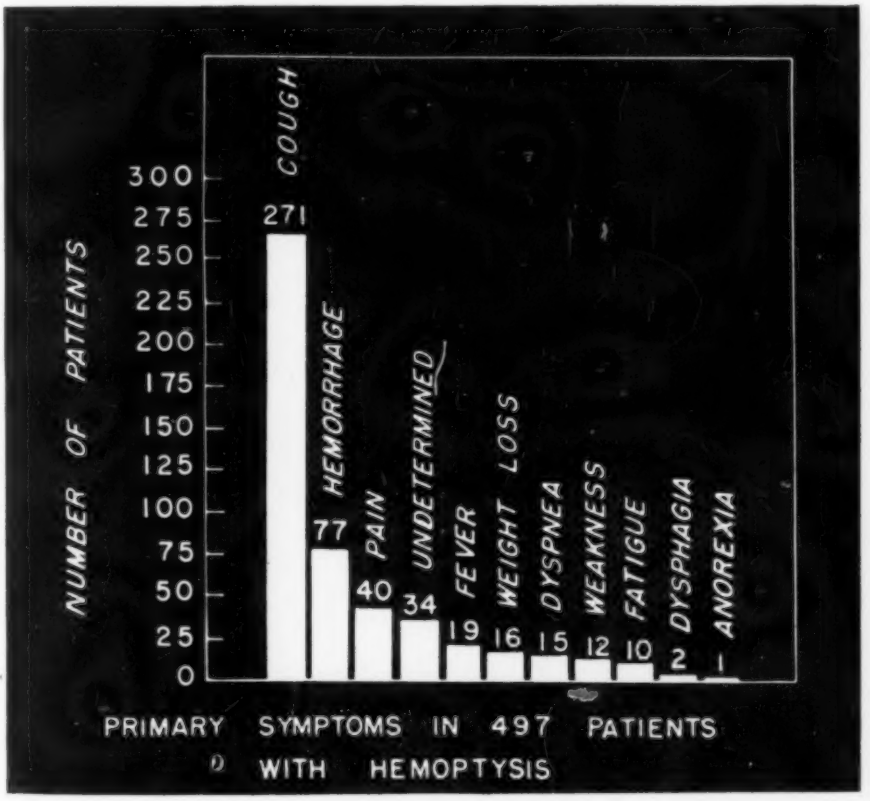

FIGURE 7

the gradual, increasing character of this complaint, the patient's tendency to explain fatigue on the basis of other causes, and the early lack of appreciation of the importance of this symptom by the physician, the true place of this complaint in the symptomatological sequence is not shown in this analysis. With these considerations in mind, Figure 7 is presented mainly to show the much greater preponderance of cough as a primary symptom,

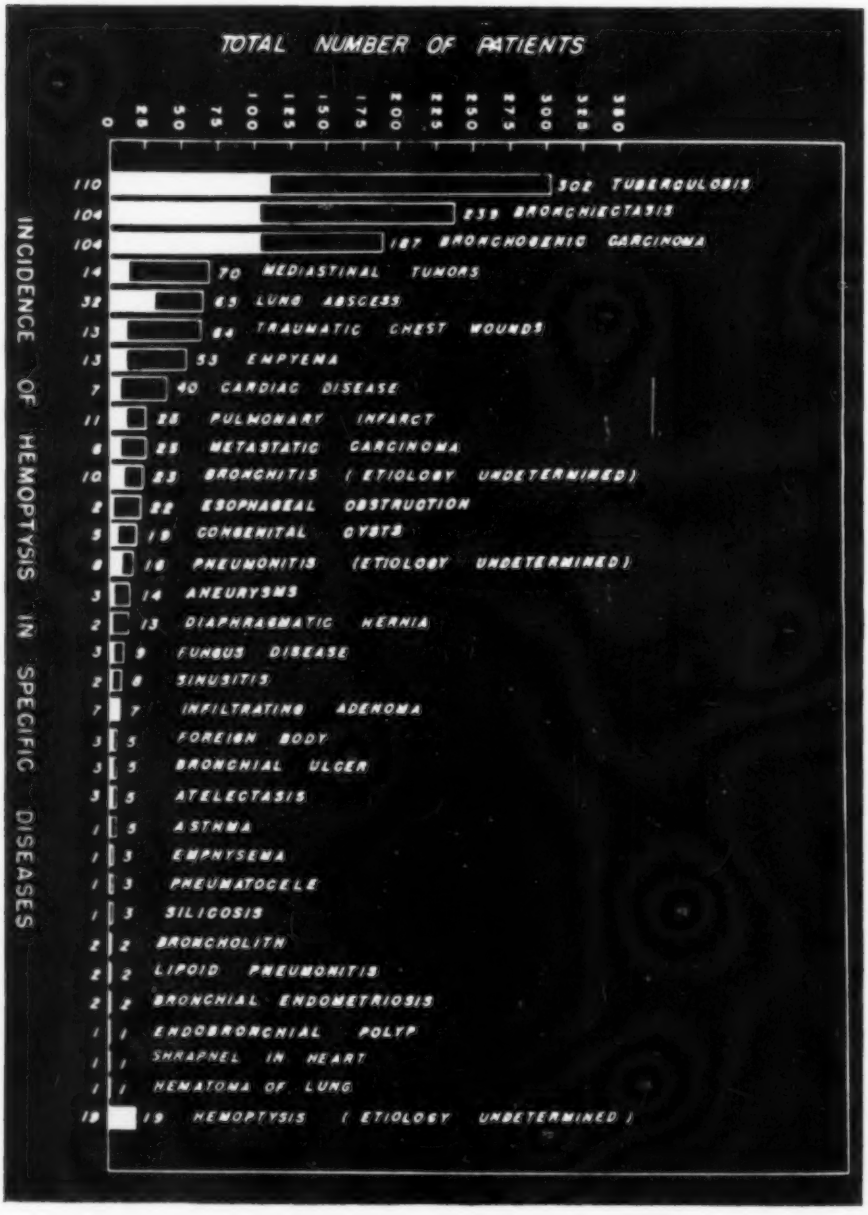

FIGURE 8

occurring in 62 per cent of the cases, while hemoptysis, as a first symptom, was only noted in 21 per cent of the patients. Jackson and Diamond[3] referred to the relative rarity of hemoptysis as an initial symptom in bronchogenic carcinoma, and we find statistical corroboration of their impression that bleeding is more commonly a late occurrence in the sequence of symptoms in bronchogenic carcinoma.

The diseases were analyzed in regard to the relative incidence of hemoptysis in each, and this is shown in Figure 8. Thus, we see an almost equal amount of shaded area in the column signifying bronchogenic carcinoma; bronchiectasis; and tuberculosis, although tuberculosis was the disease most commonly encountered. In order to bring out this incidence in a more emphatic manner, Figure 9 represents percentage incidence of bleeding in individual diseases, and shows that bronchogenic carcinoma leads all the rest with 53.6 per cent, while lung abscess has 49 per cent; pulmonary infarct 44 per cent; bronchiectasis 45 per cent; tuberculosis 36.5 per cent.

In view of the common concept of the incidence of hemoptysis in tuberculosis, it would seem best to describe the tuberculosis

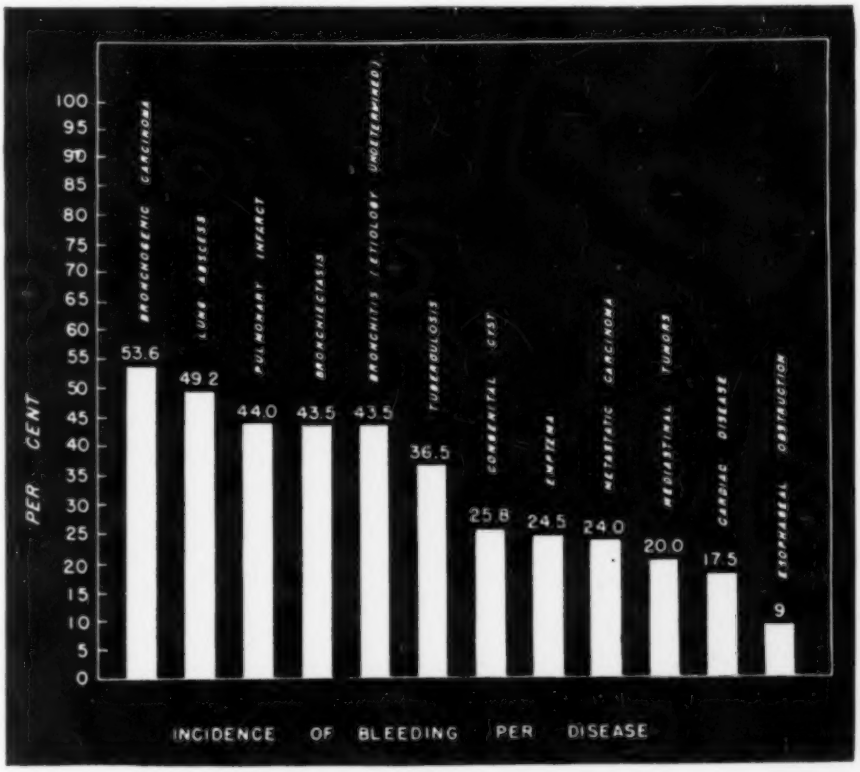

FIGURE 9

series first. The cases of tuberculosis constitute 302 patients, in which group 36.5 per cent noted bleeding. It should be emphasized that this was a group of patients in a sanatorium with disease of long standing. Each was individually questioned regarding hemoptysis, so that even single instances of streaking were included in the bleeding group. It is felt that this group of tuberculous patients constitutes a good general average type similar to those who might be seen by the diagnostician.

It is fitting, in view of the present concept of the significance of hemoptysis, that the next group should be the group with bronchogenic neoplasms. There are 187 patients in this group of which 53.6 per cent complained of hemoptysis in varying degrees. In reviewing any large group of patients with bronchogenic carcinoma, it is striking to note the difference of the time of onset of bleeding in relation to the duration of the disease. There is a distinct tendency for this symptom to occur relatively late in the sequence of symptoms, being preceded by change in cough pattern, and by fatigue and by bizarre sensations in the thorax. It also must be stressed that lesions occurring within a major bronchus, must be expected to present the symptom of hemoptysis at an earlier stage than lesions occurring in the periphery of the lung parenchyma. Indeed, in many instances, lesions must be expected to produce hemoptysis in direct relation to the tendency for that area of the lung to become infected. It is striking not only statistically, but also in our clinical observations, that one notes the high incidence of hemoptysis in cases of pulmonary abscess, and also for the tendency of this bleeding to be more excessive in this type of lesion. Thus, in our group of 65 cases of lung abscess, 49.2 per cent described hemoptysis as a prominent symptom. In any case of chronic pulmonary suppuration, it is reasonable to expect bronchial ulceration and secondary bleeding. It is not surprising to see that 43.5 per cent of a group of 239 patients with bronchiectasis had hemoptysis. It would be well to mention, however, the frequency with which this bleeding is not in large amounts and, also, the frequency with which such bleeding occurs only in bronchiectasis of long standing—five or ten years. The hemoptysis seen in so-called "dry bronchiectasis" deserves mention as it may be the only symptom of the disease.

The occurrence of hemoptysis in association with empyema of the chronic type appears to be quite high in the attached chart. Many of these patients described the bleeding occurring with their initial pneumonia, or with recurrence of same, and it has been attempted to describe the symptom only as that occurring in relation to their empyema, rather than in relation to the primary pneumonia. A distinct number of these patients developed

a postpneumonic bronchiectasis, as well as empyema, and bled, in all probability, from this source. Other patients undoubtedly bled from too rigid drainage tubes which may have been in malposition. Still another group includes hemoptysis occurring in empyemata with bronchopleural fistula.

The group of patients, described as chronic nonspecific bronchitis, was 23 in number and showed 10 patients, or 43.5 per cent, with bleeding. This, of course, does not constitute the actual occurrence of hemoptysis in this disease. The majority of these patients were referred to the chest clinic because they were thought to have lesions other than chronic bronchitis, or because of the hemoptysis itself, and we were unable to define any other lesions as the actual cause. It would perhaps be best to classify each of the patients having bleeding in chronic bronchitis, as patients with bronchial ulcer, but such ulcer was outside the range of vision of the bronchoscope.

Again, the figures for bleeding in relation to heart disease must be qualified, because, in the majority of the cases, the patients were referred to the chest clinic because of the cardiac lesion rather than because of the hemoptysis itself. The statistics for the occurrence of bleeding in relation to foreign body show 43 per cent of such patients presenting hemoptysis. These were all instances of foreign body which may not have been suspected prior to referral to the chest clinic, or instances of foreign body of long duration. This lesion, in the acute stage, is more frequently seen by the otolaryngologist.

It is of importance to note the frequency of hemoptysis in metastatic carcinoma; that is, 5 patients in a group of 24, or 21 per cent. It is felt that little attention has previously been drawn to this occurrence. We have encountered four instances of major endobronchial metastasis in the past few months, secondary in one instance to sarcoma of the bone, in another instance to transitional-cell carcinoma of the testicle and in 2 cases to carcinoma of the breast.

The occurrence of hemoptysis in relation to aortic aneurysms is not uncommon, just as we see hematemesis in association with certain aneurysms eroding into the gastrointestinal tract. In the thorax, the bleeding may not necessarily be due to actual communication between the aorta and the bronchial tree, but can be secondary to compression effect upon the bronchial tree. It happens that two patients presenting hemoptysis in connection with aortic aneurysm were encountered in the recent work which we have been carrying out in the form of cellophane wrapping of such lesions, and, in both instances, there was a direct com-

munication between the aorta and bronchus, which was remedied on the operating table at the time of aneurysmorrhaphy.

It is not felt that any specific discussion need be attached to the occurrence of hemoptysis in relation to congenital cyst inasmuch as the bleeding occurred in all instances of cysts with secondary infection. It is similarly felt that infection played a role in the occurrence of hemoptysis secondary to atelectasis of undetermined origin. The series of idiopathic bronchial stenosis is too small to warrant any specific deductions, but the high incidence of hemoptysis is certainly striking. The occurrence of broncholith, as a cause of hemoptysis, has long been recognized and indeed, is frequently the reason for which the patient with broncholith consults.

The extremely high incidence of hemoptysis in relation to crushing injury of the chest, following injury by penetrating missiles, both gunshot wounds and penetrating instruments, is as one would suspect. Some stress should be laid upon the frequency with which pulmonary infarction may not be associated with hemoptysis, namely 56 per cent. The importance of lipoid granuloma or lipoid pneumonitis, as a cause for bleeding, deserves some stress inasmuch as one of the patients had four almost fatal hemorrhages and underwent total pneumonectomy under supposition of carcinoma, but the specimen revealed a diffuse lipoid granulomatosis of the entire lung associated with bronchiectatic change. The second patient, having the same disease, had less bleeding, but this proved to be his only symptom and led to x-ray investigation.

The group of patients with either chest complaints or hemoptysis, and with a final classification of "etiology undetermined," reminds us of our present limitations. However, it is felt that further periodic follow-up investigation is mandatory in this group. They may represent bronchial ulceration distal to the range of vision of the bronchoscope, small infarctions, pulmonary hypertension, blood dyscrasias in the stage of associated normal laboratory findings, and so forth. Although there may be such an entity as true "idiopathic pulmonary bleeding," it would be a healthier attitude to call it "pulmonary bleeding, etiology undetermined." In further consideration of patients with pulmonary disease associated with hemoptysis, we must mention that it is encountered in such diseases as pulmonary emphysema which, in all probability, is associated with chronic pulmonary suppuration and fibrosis. It also occurs with pneumatoceles, which are seen as a manifestation of the results of emphysema in this type of case. Its occurrence is also noted in the patients with bronchial asthma; being found most frequently with the intrinsic type of

bronchial asthma which is the type most commonly seen by the thoracic surgeon.

It should be emphasized that hemoptysis does not necessarily denote primary disease of the lung. Such disease may be secondary from overflow spillage in an obstructed esophagus; it consists of secondary bronchiectasis and chronic pulmonary suppuration. The important thing which we would like to stress in this regard is the occurrence of hemoptysis in association with tumors of the mediastinal structures. Thus, we have found the mediastinum as the primary site of disease in 14 patients presenting the symptom of pulmonary bleeding. Hemoptysis can occur in association with pulmonary hypertension which is so frequently a corollary of mitral stenosis and, thus, we have observed 7 patients, in a group of 40 cardiacs, presenting the symptom of pulmonary hemorrhage. It should be further stressed that pulmonary bleeding is an unusual occurrence in cardiac disease of congenital origin, although it may be masked because of its occurrence in children. Pulmonary hemorrhage, however, is not unknown in children, as exemplified by hemoptysis in our youngest patient who was 7 years of age. We also note pulmonary bleeding in association with disturbances of mediastinal vessels, such as aneurysm of the aorta and of the pulmonary artery. Apology must be made for the relative scarcity of the mycotic lesions of the bronchial tree as there are only 9 patients with such disease listed in this large group, and, of the 9 cases, 3 presented bleeding. Again, it must be emphasized that in all probability some of the group with "chronic bronchitis" were fungus disease without a positive culture or smear being obtained.

The Investigation of Patients with Pulmonary Hemorrhage:

One would like to lay considerable stress upon the importance of noting the character of a patient's hemoptysis associated with so-called acute lesions of the lung. It has been a distressing experience to all people particularly interested in the subject of pulmonary neoplasm and of tuberculosis, to find that frequently the first cause of a patient's consulting a physician has been a so-called "classical pneumonia." When we question these patients, we find that they have had atypical hemoptysis in association with this pneumonia, which should have led the attending physician to suspect some other disease. Any patient having what is suspected to be acute lobar pneumonia or bronchopneumonia in whom the hemoptysis lasts for more than a 48 hour period, should be considered atypical. This is especially true if there was not the classical "prune juice" type of sputum, and if the patient has a recurring production of small amounts of little blood clots,

or streaking, over a period of several days. Furthermore, if this patient should show any so-called slow resolution of pneumonic process, it is mandatory to rule out obstructive lesions of the bronchial tree.

In questioning any patient in regard to hemoptysis, one must be particularly conscious of the possibility of the patient's own localization of the hemorrhage (Fig. 10). Unfortunately, this does not occur in all cases. Frequently, a patient who could not previously localize his hemorrhage, after being told to make sure on a subsequent occasion, will be able to point practically to the direct spot overlying the area of pulmonary ulceration. The symptoms which patients may associate in their chests with hemoptysis, consist largely of sensation of deep burning pain or discomfort, either prior to or subsequent to the hemorrhage. In hemoptysis of any degree, the patient may describe a bubbling sensation or an internal scratching sensation at the area of hemorrhage. Physician patients, in whom it has been our privilege to observe pulmonary hemorrhage, frequently describe the definite sensation of inability to breathe with the involved lung during the time of bleeding, and a splinting of the chest which they are unable to control. We have found the position which the patient assumes during hemorrhage to have some localizing value. Frequently they prefer to lie upon the side from which the bleeding arises, both because of lessening of cough due to contralateral spillage and a subconscious desire towards splinting the affected side.

As physicians, we are all duly impressed with the importance of careful examination of the chest in the patient who is actively bleeding, which must be done with a minimum of disturbance to the patient, omitting percussion and only the gentle application of the stethoscope as necessary. It is extremely important in such cases, if we hear an area of distinct pulmonary infiltration or coarse rhonchi localized to one side, that we must consider this

FIGURE 10

SUBJECTIVE LOCALIZATION OF PULMONARY BLEEDING

A. Antecedent, associated or subsequent chest sensations.
   1. Burning
   2. Heaviness
   3. Bubbling
   4. Vague pain
   5. Bronchial roughness or scratching.

B. Sensation of splinting.
   a. Decreased aireation capacity on side involved.

a possible adjunct to our localization of the site of bleeding. This is, of course, open to considerable question because of the possibility of spill-over, especially into the right main bronchus, and we will note considerable erroneous findings due to spill-over if we are not conscious of this potentiality.

The need of an x-ray as an aid to showing areas of possible sites of pulmonary bleeding, the use of bronchography and of the bronchoscope, and sputum studies, do not need further mention. However, it is of importance to remember that in some cases, wherein it is particularly difficult to define the site of bleeding, it may be necessary to bronchoscope the patient during the actual bleeding period in order to see the site of bleeding and outline the proper course of therapy.

One cannot discuss the investigative measures relative to pulmonary hemorrhage without mentioning the group of patients in whom no demonstrable cause was found. Thus in our group there are 19 cases or 0.5 per cent of the group with bleeding. In the series of Jackson and Diamond,[3] mention is made of 34 cases or 0.8 per cent of the total. They noted the site of bleeding in 73 of a total of 82 cases of bronchogenic carcinoma. Since the earlier examination of patients with this lesion, the frequency of positive bronchoscopic biopsy has decreased from previous claims of 70 to 80 per cent to below 50 per cent. This has also been due to the increased use of exploratory thoracotomy in peripheral lesions. Recent papers have shown the value of study of the sputum for tumor cells and which may give 85 to 90 per cent positive diagnosis in pulmonary neoplasm. This then is an helpful adjunct to the diagnostic armamatarium and should decrease the limitations of our present modes of investigation. As the years have progressed, greater interest has been paid to mycotic lesions. True pathogenicity of previously unsuspected fungi has been recognized. The greater the interest of the diagnostician in mycotic lesions, there is an increasingly greater number of pulmonary mycoses discovered.

Exploratory thoracotomy is now an accepted and clinically safe operative procedure. With the intelligent use of this procedure a still further reduction of the category of "hemoptysis, etiology undetermined" can be expected. Undoubtedly, there are instances in which determination of the etiology of pulmonary bleeding may not be of practical therapeutic benefit to the patient. Thus both our group of "chronic bronchitis" and Jackson and Diamond's group of "tracheobronchitis" may not have benefitted clinically from intensive investigation, but together they constitute only 10 per cent of our combined groups, while 29 per cent of the combined group proved to have bronchogenic carcinoma. There-

fore, it is felt that since hemoptysis signified serious underlying disease in 85 to 90 per cent of cases, intensive investigation is necessary and further improvement of our diagnostic methods should be sought.

SUMMARY AND CONCLUSIONS

1) A study of 1,316 patients with thoracic disease has been presented, 497 of whom had suffered pulmonary hemorrhage.

2) The clinical significance of pulmonary bleeding has been statistically evaluated.

3) This symptom predicates serious underlying disease in 90 per cent of patients presenting it and demands immediate and intensive investigation.

4) The relative frequency of the occurrence of hemoptysis in individual disease entities has been noted. It may occur in any disease associated with bronchial ulceration or compression. The relatively higher incidence in bronchogenic carcinoma, bronchiectasis and lung abscess than in pulmonary tuberculosis has been stressed. The occurrence of bleeding with mediastinal lesions and tumors metastatic to the lung is emphasized.

5) Emphasis is laid upon the importance of any variation from the usual type of hemoptysis seen in "acute pneumonia," and the need for investigation to rule out possible underlying neoplasm.

6) No correlation can be made between the type of hemoptysis and the underlying disease, other than a tendency to more copious hemorrhage in patients with pulmonary abscess.

7) The importance of the patient's subjective localization of the bleeding site is stressed, and the methods of clinical investigation outlined and discussed.

8) With the addition of staining methods for the study of tumor cells in the sputum and the intelligent use of exploratory thoracotomy, a decrease in the "hemoptysis, etiology undetermined" group is to be expected.

9) It is hoped that this analysis may aid in a better understanding of the clinical significance of pulmonary hemorrhage and thus lead to the earlier recognition and treatment of thoracic disease, especially tumors.

RESUMEN Y CONCLUSIONES

1) Se ha presentado un estudio de 1,316 pacientes con enfermedad torácica, 497 de los cuales sufrieron hemorragia pulmonar.

2) Se ha hecho un avalúo estadístico del significado clínico de la hemorragia pulmonar.

3) Este síntoma indica la existencia de enfermedad grave en el 90 por ciento de los pacientes que lo presentan, y exige inmediata e intensa investigación.

4) Se ha anotado la relativa frecuencia de hemoptisis en diferentes entidades morbosas. Puede ocurrir en cualquiera enfermedad acompañada de ulceración o compresión bronquiales. Se ha recalcado que este síntoma es relativamente más frecuente en el carcinoma broncógeno, la bronquiectasia y el absceso pulmonar que en la tuberculosis pulmonar. Se ha hecho hincapié sobre la ocurrencia de hemorragia en lesiones mediastínicas y en metástasis pulmonares de tumores.

5) Se recalca la importancia que se le debe dar a cualquiera variación del tipo común de hemoptisis que ocurre en "neumonía aguda," y la necesidad de hacer una investigación para eliminar la posible existencia de un neoplasma.

6) No se puede hacer ninguna correlación entre el tipo de hemoptisis y la enfermedad que la causa, excepto que en pacientes con absceso pulmonar existe la tendencia a hemorragias más copiosas.

7) Se recalca la importancia de la localización subjetiva del paciente del sitio de la hemorragia, y se bosquejan y discuten los métodos clínicos de investigación.

8) Con la adición de técnicas colorantes para el estudio de células de tumores en el esputo y el inteligente empleo de la toracotomía exploratoria, se espera que disminuirá el grupo "hemoptisis, etiología no determinada."

9) Se abriga la esperanza de que este análisis pueda ayudar a un mejor entendimiento del significado clínico de la hemorragia pulmonar y que conduzca así al reconocimiento y tratamiento precoces de enfermedades torácicas, especialmente tumores.

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Discussion

H. ANIDO, M.D.
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In connection with the control of pulmonary hemorrhage I wish to report two cases in which total pneumonectomy as an emergency measure had to be performed to control pulmonary hemorrhage. The operations were by Dr. A. Rodriguez Diaz, chief of our surgical staff.

One was a 22 year old male with extensive tuberculous lesions

that affected almost the entire left lung. This patient was contemplating a total pneumonectomy when he presented an acute reactivation: fever of 104, intensely toxic. He was treated with streptomycin, aerosol and intramuscular. Temperature became normal within 15 days. Four days later he had a profuse hemorrhage that could not be controlled with the usual procedures. Pneumothorax could not be used because it was previously attempted in various occasions and failed. The internists thought that his only chance was resection in spite of the fact that the right lung showed a slight bronchogenic spread.

Total pneumonectomy was performed under penthotal, endotracheal nasal intubation and local anesthesia. The streptomycin was continued. The patient received a total amount of 200 grams. He is perfectly well 4 months after operation.

The second case was a 52 year old male with multiple abscesses of the right lung, who had an uncontrollable hemorrhage of three day's duration. Total pneumonectomy was resorted to as a desperate measure and the patient is well three months after operation.

Discussion

ALFRED L. KRUGER, M.D., F.C.C.P.
Norfolk, Virginia

Dr. Abbott has given us a clear understanding of the significance of pulmonary hemorrhage by enumerating the many conditions which may be associated with the expectoration of blood. This symptom constitutes a direct challenge to the clinician for it usually is associated with advanced disease irrespective of the cause and hence, demands an early complete, detailed diagnostic study if the patient is to receive curative therapy. In my experience the symptom which most frequently brings the patient to seek medical advice is the presence of blood in the sputum. Were hemoptysis an earlier symptom, particularly in tuberculosis and malignancy, these patients would consult a physician much sooner and our salvage rate would show a significant rise. But unfortunately, it is not. In only 1.8 per cent of Jackson's cases of malignant bronchial tumors was it an initial manifestation and of the 82 cases who had hemoptysis definite changes in the x-ray film were clearly present. In tuberculosis, we found that 35 per cent of the patients admitted to the sanatorium gave a history of hemoptysis and nearly all belonged to the moderately and far advanced group.

I would like to emphasize the diagnostic importance of a careful history and physical examination. Many of us are too prone to rely too much on x-ray examination with minor regard being placed on the physical findings. In those cases where roentgen study has been negative, one should not too readily assume without further proof that the cause of the bleeding is a bronchial erosion. One must be ever aware of the possible existence of a more serious pathological condition, and I would make a plea for earlier bronchoscopic study and even if this be negative and the symptoms persist, to repeat the examination early.

A case I saw will emphasize the points I have made: namely, the importance of the proper evaluation of physical signs, the frightening effect of hemoptysis and the value of early bronchoscopy. About four years ago, I was consulted by a physician, forty-five years of age. For four weeks, especially in the evenings, he had been bothered by a wheeze which he had never noted before. This was associated with a minimal dry cough which he had had for many years. This apparently caused him no concern until the morning that I saw him, when he noted streaks of blood in his sputum after a mild coughing spell. Chest examination revealed a few fine inspiratory and expiratory squeaks over the left lower lobe. A chest x-ray film was negative and inspiratory and expiratory films failed to show any evidence of obstructive emphysema. In spite of this, in view of the other evidence which we had, namely, recent onset of wheezing in a forty-five year old male with localized signs in the chest and bloody sputum it was felt that he probably had a tumor in the left lower lobe bronchus. Bronchoscopy was advised and this revealed the presence of a mass in the left lower lobe bronchus which on biopsy proved to be malignant. A left pneumonectomy was done by Dr. Brian Blades, and the patient is now back in practice.

Discussion

LESLIE B. SMITH, M.D., F.C.C.P.
Phoenix, Arizona

It is time for all of us to put forth an effort in the dissemination of the material presented by Dr. Abbott, to the profession as a whole. To illustrate the point I would like to cite one simple case.

A midwestern banker, whose age was 60, coughed up some blood 18 months before I first saw him. He went to his physician, who examined him and who was thorough enough to even take an

x-ray picture of the patient's chest. The physician informed the patient that there was "a small spot on the lung and for him to take it easy." During the next 18 months this patient continued to have blood-streaked sputum on several occasions, for which he consulted the physician several times. At least on three occasions during the 18 months period he had a definite pulmonary hemorrhage. After about 16 months of observation the physician told the patient, "Bill you had better go to Arizona for a few months before you get into trouble." Needless to say, when this patient arrived in Arizona we saw a pathetic picture; that is an extensive, inoperable carcinoma of the lung. Had this patient's physician been duly impressed by the significance of hemoptysis, or had the patient himself, it is my opinion that he was seen early enough that his life might have been spared by surgical procedures.

Dr. Abbott has told us that tuberculosis is too frequently considered the cause of hemoptysis and has shown us that actually it ranks below carcinoma. During the course of years an axioma has arisen in the medical profession which is to the effect "that hemoptysis is tuberculosis until proved otherwise." Then too frequently we find doctors shortening this statement to read: "hemoptysis is tuberculosis," and without too thorough a search the diagnosis is missed, when an individual has a curable disease. This axiom should be destroyed and maybe a new one substituted to the effect that "hemoptysis is carcinoma of the lung until proved otherwise." It is my opinion that we, as members of the American College of Chest Physicians, should put forth a desperate effort to publicize this point to the medical profession, as well as to the laity.

In the same vein of thought there is another almost axiomatic statement which we often hear, namely that "a spot on the lung is tuberculosis"; hence, many physicians and a great proportion of the laity consider the term "spot on the lung" and tuberculosis to be synonymous. If we are to continue to destroy carcinoma of the lung before it has reached an incurable state we must put forth a campaign to destroy this fallacious impression.

In closing I wish to urge that we diligently crusade to publicize to the medical profession as well as to the laity, the type of knowledge given us this morning by Dr. Abbott. He has dealt with symptoms, which are things that doctors and laity alike should be able to interpret more accurately, if they are given the proper basic information.

Streptomycin in Tuberculous Meningitis Report of a Case*

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The treatment of tuberculous meningitis with streptomycin is under critical observation at the present time. The advent of this new drug was greeted with much enthusiasm but further clinical experience on a greater number and variety of cases has led to better appreciation of its merits and dangers. It is true that in most cases of tuberculous meningitis the immediate effects of streptomycin therapy have been so striking as to promise hope of recovery. On the other hand many of these hopes have not materialized.

The following is a report of a case of proven tuberculous meningitis that has been treated with streptomycin.

The patient, F. McK., a 34 year old, white male, entered the hospital on the 21st of June, 1946, with the diagnosis of meningitis of unknown origin. His chief complaints were headache, blurred vision, malaise, nausea and vomiting. These had been ushered in a few hours previously by a single shaking chill followed by a temperature rise to 101 degrees F.

He gave a history of known tuberculosis of the right lung which was discovered in July 1945 and was responding satisfactorily to pneumothorax therapy. In December of 1945 a small amount of fluid was aspirated from the right side of his chest. At that time he also developed ascites and 2000 cc. of straw-colored peritoneal fluid were removed. He gave a history of drinking unpasteurized milk. He did not use alcohol and never had catarrhal jaundice. Sputum has been negative for acid-fast bacilli since April of 1946. The last pneumothorax refill was administered five weeks prior to his present illness. There were no other pertinent findings in his past medical history and his family history was not significant.

Physical examination revealed a toxic, irritable white male, complaining of severe headache and nausea. Speech was thick and difficult. Response to verbal stimulation was slow and labored. He could not write or read his own name. He exhibited nuchal rigidity, absent deep tendon reflexes and positive Babinski, Chaddock, Gordon and Oppenheim signs. Tuberculous meningitis was considered the most likely diagnosis but considerable laboratory work was done to rule out other conditions.

The agglutination series was negative, malaria studies were negative, the icteric index was 5 and the cephalin flocculation showed nothing abnormal. On admission the blood count showed 84.4 per cent hemo-

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globin, 4,250,000 RBC, 6,000 WBC, with a normal differential count. Urinalysis and serologic studies were negative. The spinal fluid showed no organisms at first but the second tap revealed pellicle formation and a few acid-fast bacilli were seen. These were later cultured. The spinal fluid was cloudy, globulin was greatly increased, the cell count was 139 with 80 per cent polymorphonuclear cells and 20 per cent lymphocytes; dextrose was 37 mgm. per cent and the tryptophane test was positive. The sputum was repeatedly negative for acid-fast bacilli.

The temperature on admission was 102 degrees F., the pulse was 100 and the respiratory rate 20 to 25. Penicillin therapy was immediately started but had no effect. Blurring of vision became more marked and difficulty with urination developed. The temperature continued to rise daily to 102 degrees F. and projectile vomiting made its appearance. The patient's condition, heretofore, critical, now became grave.

On the 28th of June, eight days after admission, streptomycin therapy was instituted and on the 30th of June the penicillin was discontinued. Initially the patient was given 2½ grams daily in divided doses by the intramuscular route and 100,000 units intrathecally every other day. His general condition immediately started to improve. During the first month the temperature gradually subsided. The number of cells in the spinal fluid diminished considerably and the fluid itself appeared clearer although a pellicle still formed on standing. Headache, nausea and vomiting persisted but were not so bothersome. The patient was frequently flushed after intrathecal injection of the drug and complained of shooting pain down the legs. This was also accompanied by a transient increase in severity of the headache and dizziness.

Gradually the nuchal rigidity decreased but did not disappear completely until 4 months later. All other neurological signs disappeared with the exception of ankle clonus which persisted for five months.

The second month of treatment was marked by further clinical improvement which was very slow and steady. Some of the signs of streptomycin toxicity made their appearance. These were: slight deafness, tinnitus, pain in the legs on intrathecal administration, nausea and varying degrees of hyperaesthesia. This called for a change of dosage and thereafter the patient received 100,000 units of streptomycin every four hours intramuscularly, while continuing on the same intrathecal dose. The above-mentioned signs then lessened.

In the third month of treatment the drug was discontinued for five days because the patient had improved so greatly and the test period was over. Vomiting began three days after discontinuance accompanied by a rise in temperature. Streptomycin therapy was quickly resumed in the same dosage but the vomiting persisted and became very severe. The white blood cell count remained normal and the number of cells in the spinal fluid rose only slightly. The sugar content of the fluid remained at 27 mg. per cent and the chlorides at 528 mg., the cobweb coagulum still being present. No organisms could be recovered or cultured. Intractable vomiting now became a great problem. Intravenous fluids and blood transfusions were frequently given. Amino acids or plasma by vein invariably produced severe reactions. The patient became dehydrated and lost flesh rapidly. The blood chlorides sank to 247. This, in combination with a blood pressure of 90 over 72, weakness and vomiting prompted the empirical use of adrenal cortical extract and salt. Unfortunately the laboratory was not equipped to do blood sodium or potassium determin-

ations. Atropine sulphate did not relieve the vomiting and it was only after a Miller-Abbott tube was passed through the pylorus and hourly jejunal feedings given, that the patient was brought under control. After one week the blood pressure and chlorides rose to normal levels so the administration of adrenal cortical extract was stopped. The tube remained in situ for ten days. Then the patient began to eat well enough to warrant its removal. Slowly he began to regain the ground he had lost. He no longer complained of headache but did become quite dizzy upon raising the head. Vomiting attacks gradually decreased in frequency and severity until occasional morning nausea was all that was noted.

By the end of the fifth month the patient had shown much clinical improvement. Vomiting was very infrequent and only occurred after breakfast. Fluids and most solid foods were very well tolerated. He looked forward to recovery with amazing confidence characterized by a cheerful and alert mental attitude. Speech was normal and writing improved rapidly. Further progress was evidenced by a daily walk about the room despite dizziness. He used a bedside commode. Because of occasional diplopia and somewhat hazy vision several eye consultations were requested. All these examinations were negative. During the course of the month his weight was not quite maintained and his muscles remained flabby. Whenever streptomycin was administered intrathecally the same shooting pain was noticed in the underlying leg and in the scrotum.

The laboratory now reported a slightly xanthochromic spinal fluid with only eighteen cells, increased globulin and a normal dextrose content of 50 mg. per cent. A pellicle still formed on standing but yielded no acid-fast bacilli on culture or guinea pig inoculation. The blood count continued to show a moderate anemia and the sedimentation rate was 16 mm. per hour. The NPN and blood sugar were normal and the total plasma proteins were 7.4 with 3.63 globulin. The only persistent neurological finding was a mild degree of ankle clonus. The temperature varied from 98.0 to 99.6 degrees F.

Streptomycin was continued in the same dosage throughout the sixth month and clinically the patient improved in spite of the spinal fluid findings. He felt well even though dizziness persisted whenever he stood upright. Toward the end of the month he was walking to the bathroom. His gait was so unsteady that he had to support himself by touching or holding nearby objects. Ankle clonus decreased. A good appetite was responsible for a two-pound gain in weight. Diplopia and hazy vision remained about the same. All tests of kidney function were satisfactory. The red cell count and hemoglobin rose slightly but the white cell count was somewhat low at 4,500. No eosinophiles were present. The sedimentation rate varied from 9 to 15 mm., the spinal fluid sugar rose to 90 mg. per cent, the cells reached 200 and the protein increased to 108. The patient's temperature during this month frequently reached 99 and occasionally 100 degrees F. Sputum remained negative for acid-fast bacilli.

A milestone in the history of the case was reached in the seventh month for it was then that streptomycin therapy was finally discontinued. The patient began to complain of increasing pain in the hips upon intramuscular injection and so it was decided on January 10, 1947 that this mode of administration be stopped. Intrathecal injections

were continued as before but it quickly became apparent that this also was causing increasing distress The pain would now begin as soon as the needle was introduced whereas previously it had never occurred until the drug was injected. In addition it was becoming more difficult to perform an adequate puncture due, presumably, to the local changes that had taken place in the tissues. On the 15th and 18th of the month the patient developed transient paraplegia and a transient loss of bladder function. For this reason intrathecal injections of streptomycin were discontinued. Since that time he has received none of the drug whatsoever.

A neurological examination now revealed atonia of all muscles, particularly of the lower extremities. The muscles were flaccid and weak. All deep tendon reflexes were active and no sensory disturbances were present. Ankle clonus was no longer apparent. A caloric stimulation test was normal for both ears but a whispered voice test showed loss of the ability to hear high tones. The patient had no difficulty in hearing the normal speaking voice.

It is interesting to note that prior to the discontinuance of streptomycin, particularly in the last month of treatment, the temperature frequently reached 100 and occasionally 100.6 degrees F., but as soon as the drug was stopped the temperature fell and since that time has only once been above 99.2.

The patient was cheerful and boasted of a good appetite. Clinically he gained with amazing rapidity. The most remarkable occurrence was a 14-pound gain in weight during the seventh month of treatment. Diplopia and hazy vision gradually decreased. His gait was still very unsteady.

The last spinal fluid examination prior to termination of the drug therapy showed 24 cells, 49 mg. per cent sugar and a negative tryptophane test. Cultures continued negative for acid-fast bacilli. Other laboratory data which included complete blood counts, urinalyses, bromsulfalein, urea clearance, NPN, creatinine and sugar were all within normal limits.

In the middle of February, one month after discontinuance of the streptomycin, a change was seen in the patient's condition. Headaches became more severe and the customary cheerfulness changed to apprehension. Suspicions were aroused when he gained six pounds in one week in spite of the fact that he was not eating with the usual relish. He complained of weakness and scanty urine. Physical examination revealed a moderate amount of fluid in the abdomen. This was not tapped. A complete physical and laboratory work-up showed that the fluid was not due to constrictive pericarditis or interference with portal circulation. Tuberculosis was considered the most likely cause but actual proof was lacking. Within two weeks spontaneous diuresis occurred with resulting loss of ascites and a 10-pound loss of weight. This episode is interesting in view of the fact that the patient was reported to have had ascites in December of 1945. For the remainder of the month he felt well except for an increase in the frequency of his headaches. These would now occur about three times a day, at 2 a.m., 11 a.m., and 3 p.m., which coincided with sleep or rest hours. He obtained relief only by getting out of bed and walking about.

During the second month after termination of drug therapy clinical improvement continued. There was no evidence of fluid in the abdomen.

He gained weight at a more normal rate, about a pound or two a week. The frontal headaches that appeared during the reclining hours persisted in varying degrees of intensity and they were still relieved by standing up and walking. Dizziness was practically absent and deafness was not noticed in ordinary conversation. His gait had improved so remarkably that he could walk about without support. The diplopia and hazy vision had decreased to such an extent that he could read a newspaper or write a letter with apparent ease.

The patient showed gradual improvement during the next few months. Slowly but steadily his activities were increased without untoward effect. Walking to the washroom helped him regain the muscular tone of his lower extremities. A certain degree of ataxia was present but became increasingly difficult to demonstrate. The headaches decreased in number and intensity until they disappeared. On the fourth of July, 1947, he suffered an acute attack of appendicitis and at the time of operation the appendix had ruptured due to the patient's refusal to accept early surgery. Microscopic examination of the appendix and culture of drainage were negative for acid-fast infection. Examination of the peritoneal cavity at the time of operation failed to reveal any evidence of tuberculosis. This is important in view of the patient's past record of recurrent episodes of ascites.

Recovery from this operation was rapid with gradual cessation of drainage and thorough healing of the wound. Convalescence was uneventful. By the end of the month the patient was out of bed again and shortly reached his previous level of ambulatory efficiency.

He remained in the hospital three months following his appendectomy, during which time no further improvement was noted. He appeared perfectly normal except for slight ataxia and a moderate degree of high tone deafness. Tests of vestibular function by the Kobrak method of caloric stimulation were within the normal limits. His ordinary gait was without flaw but he had difficulty walking with his eyes closed. Neurological tests failed to reveal any other dysfunction. In September of 1947 after stating that he "never felt better in my life," he left the hospital against medical advice. His departure occurred fifteen months after admission and eight months after discontinuance of streptomycin therapy.

Due to the fact that he returned to the hospital about twice a month for pneumothorax refills, we were able to follow his case quite adequately. He has been observed for six months in this manner and he is still in a state of remission. He appears normal in all respects but when specifically questioned, it is learned that slight ataxia persists as evidenced by inability to walk along a narrow plank and a feeling of insecurity while driving a car fast. Adequate financial compensation has so far spared him the necessity of working. In January 1948 he married and is at present leading a happy home life.

SUMMARY

A case of a man with proven tuberculous meningitis is presented. After initial streptomycin therapy was instituted, he showed marked clinical improvement. When the drug was discontinued he suffered a severe relapse. Renewal of streptomycin therapy was barely able to stave off a fatal termination but after four additional months of treatment he slowly progressed to a point

where it was deemed feasible to discontinue the drug. He received about 160 grams of streptomycin in seven and one-half months by the intramuscular and intrathecal routes. His course after treatment was marred by one relatively short, self-limited episode of ascites and an attack of acute appendicitis for which an appendectomy was performed. Symptomatic therapy played a large part in combating his disease. Certain findings which persisted for several months after therapy but which eventually disappeared completely, were headache and haziness of vision. Other findings which improved after therapy but which still persist are slight ataxia and high tone deafness. The patient seems to be adequately compensating for his vestibular dysfunction. All during his illness and up to the present time he has been receiving pneumothorax refills. The chest lesion shows no change and the sputum is still negative. Twenty-two months have passed since the onset of his disease, the last six of which he has spent at home with no ill effects.

Considering the percentage of fatality in tuberculous meningitis, even since the advent of streptomycin, it is felt that this patient has progressed remarkably, possibly further than any that have been treated with this drug, and it is hoped that as time goes on the possibility of a relapse will become even more remote. October 15, 1948, still well clinically.

RESUMEN

Se presenta el caso de un hombre con meningitis tuberculosa comprobada. Después de haberse iniciado la estreptomicinoterapia el paciente mostró decidida mejoría clínica. Cuando se descontinuó la droga, sufrió una recaída grave. La reanudación de la estreptomicinoterapia a penas evitó un desenlace fatal, pero después de cuatro meses adicionales de tratamiento progresó poco a poco hasta tal punto que se creyó posible descontinuar la droga. El paciente recibió, aproximadamente, 160 gramos de estreptomicina por las vías intramuscular y céfalorraquídea en siete meses y medio. Su curso después del tratamiento fue complicado por un episodio relativamente corto de ascitis, que terminó solo, y por un ataque de apendicitis aguda que necesitó que se le hiciera una apendectomía. La terapia sintomática desempeñó un gran papel en combatir la enfermedad. Dolores de cabeza y vista enfoscada fueron hallazgos que persistieron por varios meses después de la terapia, pero que al fin y al cabo desaparecieron por completo. Otros hallazgos que mejoraron con la terapia, pero que todavía persisten, son ataxia leve y sordera para los tonos altos. El paciente parece estar igualando adecuadamente su disfunción vestibular. Durante toda su enfermedad y hasta la fecha ha estado recibiendo insu-

flaciones de neumotórax. La lesión torácica no ha variado y el esputo continúa negativo. Han pasado veintidós meses desde el comienzo de su enfermedad, los últimos seis de los cuales los ha pasado en su casa sin mal efecto alguno.

Tomando en consideración el porcentaje de desenlaces fatales en la meningitis tuberculosa, aún desde el advenimiento de la estreptomicina, se opina que este paciente ha progresado extraordinariamente, posiblemente más que ninguno otro que ha sido tratado con esta droga, y se abriga la esperanza de que mientras más tiempo pase menor será la posibilidad de que sufra una recaída.

Combination Promin and Streptomycin Therapy for Tuberculosis

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Antibiotics have been assuming a greater place in our armamentarium for the treatment of tuberculosis. Various drugs have been tried from time to time. Some of them have been discarded completely; others have been used for specific types of cases.

As time has gone on, it has become evident that dosages were entirely erratic and, further, that a combination of some of these drugs might be more efficacious.

An unusual experience (discussed in Case No. 1) resulted in the use of promin in the treatment of renal tuberculosis. The result was so dramatic that unhesitatingly this drug was used in the treatment of two more cases. In the meantime, streptomycin had become available. During the months that streptomycin was used, the necessity of smaller doses was realized, at least in the average case. Since excellent results had previously been obtained with promin in the treatment of renal tuberculosis and with the thought that a combination of promin and streptomycin might be more effective, or at least allow a decrease in the dosage of streptomycin, a combination of these two drugs has been administered in a few cases.

The streptomycin was given for a two-week period and then the patients were given a week of rest without treatment. The streptomycin was given in ¼ gram dosage twice daily. This regime was continued until they had received a total of approximately sixty grams of streptomycin. During the time that streptomycin was administered, two grams of promin was also given intravenously by one injection daily. This was given for a six-day period, and omitted the seventh day. It was given again for six days followed by an eight-day rest. This regimen was continued during the time that the patient was on streptomycin therapy.

All types of tuberculosis are being treated by this program, and it is my impression that the results are fully as good as when larger doses of streptomycin alone were used. However, this series of patients is small and the period of observation is short.

The last two cases of renal tuberculosis were treated by a combination of streptomycin and promin as given above. The results have been fully as dramatic as when promin was used. It was of

interest that this treatment had no effect on a tuberculous orchitis and tuberculous epididymitis except that when these lesions were excised, the wound healed promptly. Summaries of the renal tuberculosis cases are presented in order to stimulate further interest in the use of this combination by others.

Case No. 1: J.J., age 52, a white male. This patient was first seen in October, 1945. History revealed that kidney trouble had been present since 1918 which came to a climax first in February, 1944, when he was first cystoscoped and was told that he had tuberculosis of both kidneys. He was again cystoscoped at a later date and the diagnosis of bilateral renal tuberculosis was confirmed. When seen in October, he was having marked frequency, burning and smarting on urination, together with pain in the kidney regions. The urine was loaded with tubercle bacilli.

Streptomycin was not available to a private practitioner at this time and it was impossible to get the patient to a Veterans Administration Hospital for immediate treatment. Therefore, promin was finally resorted to as an alternative means of treatment. The patient was given two grams of promin in solution intravenously each day for twenty-four days with the exception of the second day when he was given four grams. The increased dosage on the second day caused considerable headache and, as a consequence, the dose was resumed at two grams per day. At the end of this period of treatment, the patient's symptoms had completely disappeared.

However, in July, he had an injury to the kidney regions after which reactivation of his symptoms occurred. He was given two more injections of promin and again his symptoms disappeared completely.

The patient was not seen again until February of 1947 at which time he reported that he had been to the Veterans Administration for another cystoscopic examination the previous week when no evidence of active renal tuberculosis was demonstrated. In February he was apparently healthy, gaining weight, and had no urinary symptoms.

Case No. 2: F.J.K., age 32, white male. This patient developed pain in the lower back in September, 1947, when he also had pus in the urine. In October, he developed pain in the right leg suggestive of sciatica. In November he went to an osteopath and from that time on lost weight rather rapidly. His urinary symptoms consisted of an increase in day frequency and he voided three or four times each night. He also had burning and smarting on urination.

In November he had an x-ray inspection in our Miniature Film Survey when far advanced, bilateral pulmonary tuberculosis was diagnosed and he was advised to enter the sanatorium. However, before he could be admitted, the right testicle became swollen and was painful on pressure. This involvement eventually included both the testicle and the epididymis.

The patient was admitted to the sanatorium on December 19, 1947, at which time the urine was positive for tubercle bacilli. He was immediately started on streptomycin and promin therapy. One week later arrangements were finally made for a cystoscopic examination. Retrograde pyelograms at this time revealed evidence of tuberculosis of the right kidney and ureter. However, specimens of urine obtained at this time were negative for tubercle bacilli on guinea pig inoculation. All

other specimens obtained since have been negative for tubercle bacilli. Streptomycin and promin had no evident effect on the tuberculosis of the testicle and epididymis. On February 7, 1948, the right testicle and epididymis were removed surgically. The one point of interest was that the operative wound healed immediately and has remained so.

After approximately ten daysy of streptomycin and promin therapy, the patient's symptoms disappeared. He is still being continued on the treatment.

Case No. 3: U.P.D., age 27, white female. This patient's first symptoms date to 1942 following the birth of a normal baby. She then developed bladder pain, high fever, burning and smarting on urination with pain in the left kidney region. Cystoscopic examination revealed evidence of tuberculosis of the left kidney which was then removed.

She had had some pain of the lower abdomen with frequency and some burning and smarting since this operation. This became worse in the summer of 1946, and the symptoms never improved. Sulfa drug did not improve the condition. Later tubercle bacilli were found in the urine.

After consultation with an urologist, it was decided that this patient should not be cystoscoped, at least until after a trial of streptomycin and promin therapy, because she had already had one kidney removed. Therefore she was admitted to the sanatorium and immediately started on streptomycin and promin. Within three weeks her symptoms had disappeared. The urine became negative for tubercle bacilli at the end of five days and has remained negative. She is being continued on this regimen of treatment.

SUMMARY

1) Case reports are presented to stimulate interest in the use of streptomycin and promin as a combination in the treatment of tuberculosis and especially in renal tuberculosis.

2) The series of cases presented is small and the period of treatment short, therefore the results are merely suggestive of a new trend of thought which we think worthy of further consideration by other clinicians.

RESUMEN

1) Se presentan informes de casos para estimular el interés en el empleo de la estreptomicina y la promina combinadas en el tratamiento de la tuberculosis, y especialmente de la tuberculosis renal.

2) La serie de casos presentados es pequeña y el período de tratamiento corto; por consiguiente, los resultados meramente sugieren una nueva idea que creemos merece la consideración adicional de otros clínicos.

Solving the Problems of the Tuberculous War Veteran*

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A great deal has been written about the problems of the tuberculous war veteran. The impression has been created that he is an individual set apart from the rest of the communal family and is somewhat of a problem child. Public attention having been focused on this thought, it has been assumed that all the problems in connection with the hospitalization of the tuberculous veteran, are indigenous to this particular group of people.

It has been generally accepted that the most serious problem of the tuberculous war veteran is the difficulty in keeping him continuously hospitalized until his disease has become arrested or until he has attained the maximum benefit from hospitalization and will no longer be a menace to the communty.

However, a careful study of the subject indicates that a similar problem exists in most tuberculosis hospitals in this country. Tuberculosis Topics[1] reports that approximately 30 per cent of the patients in all the tuberculosis hospitals in the United States left institutions against medical advice during the war years. Drolet[2] made a survey of tuberculous patients discharged from 41 institutions in the New York metropolitan area, which includes adjacent New Jersey. He found that out of 10,620 patients discharged during the year of 1945, approximately 29 per cent left against medical advice. In one of these hospitals, out of a total of 257 discharges, 89 per cent left against medical advice and in another hospital 55 per cent left against medical advice out of a total of 1,045 discharges.

It is generally recognized that an arrest of the disease can be attained in the majority of cases of minimal and moderately advanced and in a considerable percentage of far advanced cases of pulmonary tuberculosis, if the patient remains continuously hospitalized long enough under appropriate treatment.

The study of the causes for irregular discharges from tuber-

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culosis hospitals and of measures to be taken for their prevention must therefore be high on the agenda of every organization interested in the control of tuberculosis.

Undoubtedly the reasons vary to a certain extent among different groups of patients and in different types of hospitals. It is, however, a known fact that the standard of medical care is very rarely the cause. A review of the table prepared by Drolet shows a high rate of discharges against medical advice among hospitals having the most modern buildings and equipment and known to be very well staffed and well managed. A patient is, as a rule, not in a position to know which treatment is standard and which is substandard. Hence, the great success enjoyed by patent medicines, fads and quacks.

During the war a considerable number of tuberculous veterans left the veterans hospitals soon after they were transferred from army hospitals. The World War II veteran was sent to a veterans hospital nearest his home directly from the army. While he was a soldier, he followed orders and went wherever he was directed. His discharge from the army became effective upon his admission to the veterans hospital. In most instances the soldier was away from home a long time. He was tired of restrictions and discipline, was homesick and craved to be with his family again, permanently, not just for a visit.

It is easy to understand the man's state of mind that when the long-awaited day of his discharge from the army finally arrived, instead of being free again, he found himself once more away from home, restricted and regimented by the necessary but, nevertheless, distasteful routine of a tuberculosis institution. This was particularly irksome to the many World War II veterans who had early lesions, were practically symptom free, and who looked and felt well. It is not surprising that many of these men left the hospitals as soon as they acquired a civilian status and were free to follow their own inclinations. This condition was duly recognized and liberal allowances were made for granting leaves of absence to these patients. However, such privileges did not solve the problem in the majority of instances. This problem was, however, temporary and solved itself with the complete demobilization of the armed forces to a peace-time status.

Another frequent cause for veterans leaving hospitals of their own accord was a provision of the law which called for a considerable reduction in the pension when a patient without dependents entered a veterans hospital. This provision placed a premium on leaving the hospital against medical advice. Legislation to correct this situation was enacted by Congress in September 1946.

Generally speaking, the most common reasons why patients

leave civilian tuberculosis hospitals against medical advice are considered to be economic. Among war veterans, however, the reasons are inherent in the laws governing the hospitalization of veterans. Paradoxically, the ease of admissions and readmissions to any one of the many veterans hospitals scattered throughout the country and the better economic condition of the average tuberculous war veteran by virtue of a pension, are responsible for a considerable percentage of irregular discharges.

These conditions are unavoidable and, though just, may be a handicap to some veterans in the same nature as the excessive wealth of a parent is at times to a child.

To a non-veteran tuberculous patient, only one, rarely two, sanatoriums are available in his respective state. Admissions to the institutions that are available can be secured, in most instances, only after a long interval of waiting. To the tuberculous war veteran there are available many tuberculosis hospitals scattered over the country, some of them situated in the most beautiful locations and in the most pleasant climates. They are quite a temptation to a foot-loose individual, particularly since he knows that admission of a war veteran with active tuberculosis to any one of these beautiful institutions is practically mandatory. All a war veteran with active tuberculosis has to do to gain admission to a Veterans Administration tuberculosis hospital is to enter the front door and present evidence to prove that he is a bonafide war veteran.

Should a non-veteran tuberculous patient with limited funds become tired of the monotony of a tuberculosis institution and venture away from his home state, he will most surely become stranded in a strange land without friends and without eligibility for admission to a sanatorium for free treatment. It may be said without equivocation that there is probably no sanatorium in the country, whether state, county, municipal or private, which would admit such a patient coming to its doors. Furthermore, a war veteran has a host of loyal and helpful friends among the veterans service organizations all over the country and his funds are regularly augmented by the government in the form of pensions.

These conditions allow for the greater mobility of the veteran to follow an urge for a change of place or climate in search for the mythical land where, he believes, he may be cured by merely inhaling the "health-giving" air.

All possible measures are being undertaken by the Veterans Administration to solve the problems of the tuberculous war veteran. Whenever necessary and possible, laws are being amended toward that end. A very comprehensive follow-up system and a

case registry for tuberculous war veterans have been established and contact will be maintained with all tuberculous veterans, either directly or through the local health agencies. It can be seen, however, from the very nature of the problems, that the Veterans Administration alone cannot solve all of them. This requires the concerted efforts of the state and local health and welfare agencies in cooperation with the Veterans Administration. It is, for instance, beyond the jurisdiction of the Veterans Administration to enforce hospitalization, impose quarantine, examine contacts or indoctrinate members of the family. It is apparent then, that the state and local health and welfare agencies must step in where the Veterans Administration must leave off.

It is hardly necessary to emphasize that an open case of pulmonary tuberculosis is more dangerous epidemiologically than a case of diphtheria or scarlet fever. While the area menaced by these exanthematous diseases is usually limited by the acuteness of the disease to the patient's home, the area menaced by the open case of pulmonary tuberculosis is as wide as is his ability to travel.

Compulsory hospitalization laws for pulmonary tuberculosis have been adopted in several states in order to control the movements of open cases of pulmonary tuberculosis. This will, undoubtedly, have a tendency to prevent patients from leaving the institution against medical advice in many instances. To expect, however, that similar laws would be enacted in all the 48 states within a reasonable time, would be unduly optimistic. Experience has shown that serious problems of national scope frequently require federal laws for their solution. The need for periodic mass x-ray examinations of the entire population of the country is obvious and not beyond reach.

Simultaneously, hospitalization facilities must be provided to accommodate all active cases of pulmonary tuberculosis as soon as the disease is discovered. Without this, a compulsory hospitalization law has no meaning.

A more active and aggressive nation-wide educational campaign against tuberculosis is urged. It should be conducted not only among the various communal groups but it should be aimed particularly at the legislators, strongly emphasizing the communicable nature of the disease, the importance of continuity of treatment and the comparative ease with which it could be controlled by appropriate measures. There should be no hush-hush about a patient with active pulmonary tuberculosis who refuses hospital care, and whose home conditions and supervision are not considered adequate by competent authority.

Intramural Measures

Indoctrination of tuberculous patients in the nature and treatment of tuberculosis is recognized as a fundamental necessity. All other intramural measures designed to uphold the morale of these patients have been heretofore almost exclusively of a recreational nature. The conventional occupational therapy, consisting of various arts and crafts, a circulating library, radio broadcasts and motion pictures are employed in almost all tuberculosis institutions as a diversion to break up the monotony of a long period of hospitalization and to discourage discharges against medical advice. And yet almost one-third of the discharged patients left against medical advice in 1946 from 41 civilian tuberculosis hospitals in a well organized community like metropolitan New York.

There is no stereotyped method for the management of tuberculous patients. The methods have to be varied with the intelligence, educational and cultural background and the ambition of the individual patient. Heretofore, the program did not take this sufficiently into account. It is particularly important to bear this in mind when dealing with World War II veterans, the vast majority of whom are in their twenties.

The intelligent person, whose mental processes are not impaired by the toxemia of an acute febrile disease or by severe bodily discomfort, finds it difficult to lead the vegetative life necessitated by the prolonged bed rest in the treatment of pulmonary tuberculosis. As desirable as complete physical and mental relaxation is, we must recognize the fact that the average young tuberculous patient cannot stop thinking of the present, the future, and the most valuable years which are being extirpated from his life. This large group represents a reservoir of salvable human material which has not been heretofore adequately tapped. We should give due cognizance to this important group and adjust the management of their cases accordingly.

While the value of complete mental and physical rest in the treatment of tuberculosis cannot be disputed, the inflexible enforcement of the universally adopted rule which prohibits to all patients even reading during certain rest hours, is neither possible nor wise. In many cases, mental and physical relaxation can be more easily and effectively secured while reading an interesting book in a semi-reclining position than while trying to fall asleep in the daytime, which, if successful, would only make sound sleep at night more difficult. A book is frequently the antidote against far more disturbing thoughts. Individualization should be the keynote in applying even the all-important rest cure.

When the disease has come under control and has ceased progressing, the patient still has a long period of hospitalization ahead of him. As long as the lesion is retrogressing it is still unstable and is therefore considered active. Meanwhile, the patient has a sense of well-being which is at times a handicap. He chafes under the inactivity and is apt to leave the hospital prematurely. His energies must, therefore, be directed towards useful pursuits which will have a bearing on his future aims and ambitions, and will also be an added inducement to remain in the hospital until the completion of treatment.

Since the treatment of pulmonary tuberculosis is usually a matter of years, mental and spiritual deterioration are apt to take place and a sense of frustration is likely to result.

It is particularly vital to recognize this situation when dealing with a person in the twenties, a period when the foundation for the future economic life is usually laid. When a patient of this age spends several years in complete idleness, it may, and frequently does, change his entire outlook on life. He sees himself caught in an eddy going endlessly and aimlessly around and around, while the main stream of life is passing by him and flowing onward to greater opportunities. Under such conditions he is apt to disregard the sound, but less alluring advice of his physician, and is apt to leave the hospital of his own accord.

It is not enough to provide such a person with the usual occupational therapy in the form of some crafts or with some light reading matter. This is amusing to some extent, but a healthy and virile mind cannot continuously subsist on such poor mental fare.

Man's two greatest fears are invalidism and dependency. When a person first learns he has tuberculosis, he is suddenly confronted with these two over-powering spectres, and worry over one aggravates the other, thus creating a vicious cycle. These two problems are so mutually interdependent that for best and surest results both should be tackled simultaneously.

In order to prevent the patient from lapsing into a state of mental stagnation and from losing years of valuable time, to stimulate his lagging morale and to provide an added incentive to remain in the hospital until his tuberculosis is arrested, it is necessary to start him on the road towards his rehabilitation almost simultaneously with the medical treatment.

In most cases, a reorientation of the man's place in society and a complete revision of his plans for the future are necessary on account of his handicap. Expert guidance is as essential for this as for his medical condition. To leave his rehabilitation to chance

is as impractical and unscientific as to leave the management of his medical treatment to his own devices.

With these ideas in mind, there was organized on the Tuberculosis Service of this hospital, in November 1945, a rehabilitation team consisting of a trained vocational counsellor, an academic instructor, the social worker, and the ward physician.

Each patient found physically suitable was given an interest test, an aptitude and other indicated psychometric tests. If considered qualified for some academic or commercial studies the patient was offered every encouragement and opportunity to pursue the selected subjects with the help and guidance of the instructor.

Subsequently when a rehabilitation program was established by the Veterans Administration in all hospitals under its control, the hospital rehabilitation committee was broadened to include, in addition to the members mentioned above, the Physician in Charge of Medical Rehabilitation Section as well as representatives of other departments concerned with the various phases of rehabilitation.

The training of patients has been carried out under a staff of full-time instructors and a great variety of subjects are offered to suit different patients according to their individual tastes, tendencies, training, education and culture. Diversification is very important if we are to take full advantage of our rehabilitation program and interest in it the greatest number of patients.

Under educational therapy the most popular subjects are those leading towards a high school diploma with special emphasis on English and mathematics. About twelve of our patients have been awarded high school diplomas thus far. Among the commercial subjects, bookkeeping, typing, and stenotyping are the most popular. Business law, stenography, and salesmanship are also offered. Fine arts and mechanical drawing are diligently studied by a group under an exceptionally well qualified instructor. Other patients are being trained in radio and motion picture projector repair and a class in watch repairing is being organized.

Since most World War I veterans are in their upper fifties they are not likely to be fit for rehabilitation. Diversional occupational therapy is available to this group of patients either on the ward or in the occupational therapy shops.

It was very gratifying to note the marked improvement in the morale among patients when the present program of rehabilitation was first inaugurated in November 1945. Instead of drifting aimlessly they found themselves purposefully engaged with a definite object in view. It is relatively uncommon for a patient

who is following a planned rehabilitation program to leave the hospital of his own accord.

All occupations are taken up with the view of fitting them into the eventual rehabilitation program which has been decided upon in each individual case. Thus, while still undergoing treatment for pulmonary tuberculosis, the patient can be advancing simultaneously toward his final goal which is complete rehabilitation.

Conclusions

The modern tuberculosis institution is a great deal more than a place where only the disease is treated. Due to the long duration of hospitalization, the frequent paucity of symptoms and the fact that the majority of the patients are in their early adult years, it is important to give due consideration to the eventual aim of treatment, namely, restoration of the patient to as normal a working capacity as possible. It is necessary to utilize the patient's time and energies in useful pursuits which will be helpful towards his rehabilitation.

A well planned and well executed intramural program of rehabilitation, carefully integrated with the therapeutic regimen, designed to fit in with the post-hospital program of rehabilitation, is a vital function of the modern tuberculosis institution.

Rehabilitation should be started as early as possible after admission, consistent with the physical condition of the patient.

Skillful guidance is required to guard the patient from lapsing into the hypochondrical state of phthisiophobia, and this must be carefully balanced against the other extreme which is overconfidence to the stage of foolhardiness.

Treatment and rehabilitation are viewed as parts of one continuous program for the purpose of fitting the patient back into the social fabric as a useful, self-supporting, and self-respecting member of the community.

CONCLUSIONES

La institución moderna para tuberculosos es mucho más que un lugar donde solamente se trata la enfermedad. Debido a la prolongada duración de la hospitalización, a la frecuente escasez de síntomas y al hecho de que la mayoría de los pacientes se encuentran en los años adultos tempranos, es importante que se le dé la debida consideración al objeto final del tratamiento, a saber: restaurar al paciente a una capacidad para trabajar tan normal como sea posible. Es necesario que se utilizen el tiempo y las energías del paciente en ocupaciones útiles que contribuyan a su rehabilitación.

Un programa de rehabilitación bien planeado y bien ejecutado,

integrado cuidadosamente con el régimen terapéutico, y concebido para que encaje con el programa de rehabilitación posthospitalario, es una función vital de la institución tuberculosa moderna.

Debe comenzarse la rehabilitación tan pronto después de la admisión como sea posible, consistente con la condición física del paciente.

Se necesita una dirección hábil para evitar que el paciente caiga en el estado hipocondríaco de la tisiofobia, y debe balancearse cuidadosamente esto con el otro extremo, la confianza en demasía que lleva a la temeridad.

Se considera que el tratamiento y la rehabilitación son partes de un programa contínuo cuyo propósito es el de restaurar al paciente a la sociedad como un miembro útil y pundonoroso de la colectividad que se gana su propia vida.

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Tuberculosis Case-Finding Survey in Penal and Correctional Institutions in Ohio

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"There is, in fact, hardly an argument that can be advanced for the stern suppression of crime by penal methods that does not apply equally to the suppression of disease. . . ."[1]

Medical service in the penal and correctional institutions throughout the United States has been reported at various times to be below the level of medical care for the general population. In 1939 McCartney[2] noted that in 47 per cent of the 251 Federal and state prisons the medical service was of less than average quality and he predicted that in most cases the inmates would be released from prison in a worse physical state than when they were committed. In 1929 a survey[3] of the Federal and state prisons was made in order to determine as closely as possible the extent of the tuberculosis problem. The findings revealed that approximately 1 per cent of the inmates were known to be infected with tuberculosis and intimated that a more complete examination would reveal a larger number of cases. It was also noted that care and treatment for tuberculous patients was extremely variable and was mainly valuable in providing isolation for the infected inmates.

Following a mass x-ray survey of the mental schools and hospitals in Ohio during the first four months of 1946 it was felt desirable that the survey be extended to include penal and correctional institutions.

The inmates and employees of two penal and two correctional institutions for males in the state of Ohio are the subject of this survey. Two other institutions for female inmates, one penal and one correctional were not included in the study because of inadequate power source for operation of roentgenographic equipment.

Photofluorographic equipment utilizing 35 mm. unperforated film was the case-finding apparatus employed. Suspected tuberculous and nontuberculous lesions noted on small films were reexamined on 14" x 17" celluloid roentgenograms. The survey was conducted primarily as a screening project and recommendations were made for diagnostic follow-up in those cases where it was indicated.

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It is recognized that the specific diagnosis of tuberculosis cannot be made on the basis of x-ray evidence alone, but must depend on further clinical evaluation such as physical examination, sputum or gastric examination, and tuberculin testing. In order to qualify the findings in the light of the necessarily incomplete investigative method, cases which were considered to represent possible x-ray evidence of tuberculosis were referred to as suspected tuberculosis and were classified according to the stage of the presumable activity of the disease. This method of mass examination was deemed sufficiently reliable for the purpose of statistical analysis and an estimation of the need for tuberculosis control.

Inasmuch as 9 per cent to 11 per cent of the prison inmate population are released annually and approximately 96 per cent become eligible for release from the penal and correctional institutions of Ohio,[4] it is manifest that the return of unknown and undetected cases of infectious tuberculosis to their respective communities constitutes a serious public health hazard.

Analysis of Material

TABLE 1

GENERAL INFORMATION — PENAL SURVEY

	Number	Per Cent
Total Population:	8619	100.0 of Total Population
Inmates:	7920	91.9 of Total Population
Employees:	699	8.1 of Total Population
Total Screened:	7763	90.1 of Total Population
Inmates:	7123	89.9 of Total Inmates
Employees:	640	91.6 of Total Employees
Total Retakes:	500	6.4 of Total Screened
Inmates:	445	6.2 of Inmates Screened
Employees:	55	8.6 of Employees Screened
Total Suspected Tuberculous:	252	3.2 of Total Screened
Inmates:	237	3.3 of Inmates Screened
Employees:	15	2.3 of Employees Screened
Total with Other Pathology:	95	1.2 of Total Screened
Inmates:	87	1.2 of Inmates Screened
Employees:	8	1.2 of Employees Screened
Total Negative:	7416	95.5 of Total Screened
Inmates:	6799	95.4 of Inmates Screened
Employees:	617	96.4 of Employees Screened

The total number of individuals examined was 7,763 or 90.1 per cent of the total population. Of these, 7,123 or 89.9 per cent of the total inmate population and 640 or 91.6 per cent of the total employee population were screened. The number of cases revealing suspected tuberculous lesions on the initial x-ray films was 252 or 3.2 per cent of the total persons x-rayed.

Two-hundred-thirty-seven or 3.3 per cent of the inmates examined were considered suspected tuberculous and 15 or 2.3 per cent of the employees had x-ray evidence of suspected tuberculosis; these are rates approximately three and two times greater respectively than those noted in general industrial population surveys.[5,6]

TABLE 1a

NUMBER AND PERCENTAGE OF CASES OF OTHER PATHOLOGIC CONDITIONS BY POPULATION

	NUMBER			PERCENTAGE DISTRIBUTION		
	Inmates	Employees	Total	Inmates	Employees	Total
				Per Cent		
Total	87	8	95	100.0	100.0	100.0
Aortic	5	0	5	5.7	.....	5.2
Cardiac	9	2	11	10.4	25.0	11.6
Diagnosis Deferred	44	3	47	50.6	37.5	49.5
Other Diseases	5	1	6	5.7	12.5	6.3
Pleurisy	24	2	26	27.6	25.0	37.4

A significant finding incidental to the search for tuberculosis was the occurrence of 95 cases of suspected nontuberculous pathology, a number which represents 1.2 per cent of the total number screened.

The distribution of suspected tuberculosis by stage of the disease varied considerably between inmates and employees; 53.1 per cent of the tuberculous inmates had minimal disease, whereas only 26.7 per cent of the suspected tuberculous employees were in this stage; 30 per cent of the suspected tuberculous inmates and 20 per cent of the suspected tuberculous employees were moderately advanced, and 5.5 per cent of suspected tuberculous inmates and 6.7 per cent of suspected tuberculous employees were far advanced. A notable difference was found among those persons with reinfection, stage unknown, in which cases some form of operative treatment for the disease had been taken at a prior date; 6.3 per cent of the suspected tuberculous inmates and 13.2 per cent of the suspected tuberculous employees were in this group.

TABLE 2

NUMBER AND PERCENTAGE OF SUSPECTED CASES DISCOVERED — BY STAGE OF DISEASE

Total Suspected Tuberculous
252 (3.2 per cent) of Total Population Screened

Total Suspected Tuberculous Inmates
237 (3.3 per cent) of Total Inmates Screened

Total Suspected Tuberculous Employees
15 (2.3 per cent) of Total Employees Screened

		Number	Percentage	Corrected Combined Percentage
Primary with Activity	Inmates	1	0.4	
	Employees	0	...	0.4
Minimal	Inmates	126	53.1	
	Employees	4	26.7	51.4
Moderately Advanced	Inmates	71	30.0	
	Employees	3	20.0	29.4
Far Advanced	Inmates	13	5.5	
	Employees	1	6.7	5.5
Reinfection, Stage Undetermined	Inmates	15	6.3	
	Employees	2	13.2	6.7
Pleurisy with Effusion	Inmates	3	1.3	
	Employees	0	...	1.2
Suspected Tuberculosis, Unclassified	Inmates	8	3.4	
	Employees	4	26.7	4.8
Suspected Silicosis with Infection	Inmates	0	...	
	Employees	1	6.7	0.4

The institutional personnel screened numbered 7,763; the white population numbered 5,476 or 70.54 per cent of the total, the colored population was 2,286 or 29.45 per cent of the total, 1 or 0.01 per cent was classified as other. Colored inmates had an incidence of 2.9 per cent is compared with an incidence of 3.5 per cent for white inmates. Advanced disease among the colored inmate population was 46.3 per cent as compared with 31.2 per cent among the white inmate population.

The occurrence and distribution of suspected tuberculosis by age groups revealed 68.8 per cent of the disease occurring in the inmate group under 45 years and 60 per cent of the suspected

TABLE 3

NUMBER AND PERCENTAGE OF CASES OF SUSPECTED TUBERCULOSIS AND NON-TUBERCULOUS CONDITIONS BY COLOR

Total	5476		2286		1	
Inmates	4847		2275		1	
Employees	629		11		0	
Suspected Tuberculosis:	No.	Per Cent of Whites Screened	No.	Per Cent of Colored Screened	No.	Per Cent of Others Screened
Total	184	3.4	68	3.0	0	....
Inmates	170	3.5	67	2.9	0	....
Employees	14	2.2	1	9.1	0	....
Non-Tuberculous Conditions:						
Total	64	1.2	31	1.3	0	....
Inmates	56	1.2	31	1.4	0	....
Employees	8	1.3	0	..	0	....
Negative:						
Total	5228	95.4	2187	95.7	1	100.0
Inmates	4621	95.3	2177	95.7	1	100.0
Employees	607	96.5	10	90.9	0	100.0

tuberculosis among employees was noted in the age group over 45 years. This dissimilarity may be accounted for by the fact that, during the war years particularly, a large proportion of the employee population hired or retained was in the older age groups.

Discussion

The immediate objective of this survey in the penal and correctional institutions was to determine the extent and character of the problem of tuberculosis among these wards of the state of Ohio.

The increased prevalence of the disease which was anticipated in this special population group was borne out by the finding of 237 suspected cases among 7,123 inmates screened or a rate of 33 per thousand, which is approximately three times greater than that found in the general population group. The hazards attendent

TABLE 4

NUMBER AND PERCENTAGE OF SUSPECTED CASES DISCOVERED ALL STAGES OF THE DISEASE — BY AGE GROUP

Age	INMATES		EMPLOYEES		TOTAL	
	No.	Per Cent	No.	Per Cent	No.	Per Cent
1 to 4	0	...	0	...	0	...
5 to 14	0	...	0	...	0	...
15 to 24	31	13.1	0	...	31	12.3
25 to 34	76	32.1	3	20.0	79	31.3
35 to 44	56	23.6	3	20.0	59	23.4
45 to 54	42	17.7	3	20.0	45	17.9
55 to 64	24	10.0	6	40.0	30	11.9
65 or over	7	3.0	0	...	7	2.8
Unknown	1	0.4	0	...	1	0.4
TOTAL	237	100.0	15	100.0	252	100.0

to concentration of the disease in segregated areas appears to be reflected in the finding of 15 suspected cases among the employees or a rate of 23 per thousand, approximately twice that found in community surveys.

A program of tuberculosis control for penal and correctional institutions is by its nature, beset by many complexities. Not the least of these, is the establishment and maintenance of case-finding procedures. For maximum effect it is necessary that all new admissions and new employees receive a complete examination including tuberculin test and chest x-ray.

It is consistent with reason that the localities to which the inmates of these institutions return upon release may expect healthy, rehabilitated citizens. Prisoners have a fundamental right to the preservation of their health through the exercise of reasonable care; prevention, as well as treatment should be employed for preservation of their physical integrity. It should also be apparent that institutional employees should not be exposed to an entirely preventable disease.

Bettag[7] cites the recognition of the problem in thirty-four states, but concludes that "few states, however, have adequate control programs." In view of the technical advances in our knowledge of tuberculosis control within the past few years, this dilatory attitude on the part of state government seems inexcusable. The salvage of lives and the protection of the public health far outweigh any economic opposition which may be advanced for not establishing a modern control program for penal and correctional institutions.

SUMMARY AND CONCLUSIONS

1) A photofluorographic survey conducted in two penal and two correctional institutions in Ohio revealed 237 cases of suspected tuberculosis among 7,123 inmates screened or an incidence of 3.3 per cent. Among 640 employees x-rayed there were 15 individuals with suspected disease or an incidence of 2.3 per cent.

2) Fifty-three and one-tenth per cent of suspected disease detected in inmates was in the minimal stage, while 26.7 per cent of suspected disease in employees was in this stage. Presumably advanced tuberculosis was noted in 35.5 per cent of suspected tuberculous inmates and 26.7 per cent of suspected tuberculous employees. Thirteen and two-tenths per cent of cases among employees were classified as reinfection, stage unknown and 6.3 per cent of cases among inmates were so classified.

3) Prison wards of the state have reason to expect and should receive good preventive and curative medical care. Employees of state penal and correctional institutions are entitled to a reasonably healthful working environment.

4) A program of tuberculosis control should be inaugurated in the penal and correctional institutions which shall include physical examination, chest x-ray films and tuberculin testing of all new admissions and new employees. Annual chest x-ray examination of the entire institutional personnel should be made a part of the medical service routine.

6) A central hospital facility should be constructed for the care and treatment of active cases of tuberculosis from the penal and correctional institutions. Observation pavilions for isolation and diagnostic follow-up of questionably active cases should be established in each institution.

RESUMEN Y CONCLUSIONES

1) Un censo roentgenfotográfico que se llevó a cabo en dos instituciones penales y dos correccionales de Ohio reveló 237 casos de tuberculosis sospechada entre 7,123 reclusos examinados, o sea una frecuencia del 3.3 por ciento. Entre 640 empleados radioscopiados se encontraron 15 individuos con enfermedad sospechada, o sea una frecuencia del 2.3 por ciento.

2) El 53.1 por ciento de la enfermedad sospechada que se descubrió entre los reclusos estaba en el período mínimo, mientras que el 26.7 por ciento de la enfermedad sospechada entre los empleados estaba en ese período. Se notó lo que se supuso ser tuberculosis avanzada en el 35.5 por ciento de los reclusos en los que se sospechó tuberculosis y en el 26.7 por ciento de los empleados igualmente sospechados. El 13.2 por ciento de los casos entre los

empleados fueron clasificados como de reinfección de período desconocido y el 6.3 por ciento de los casos entre los reclusos fueron clasificados así también.

3) Los reclusos de las prisiones del Estado merecen y deben recibir buena atención médica, tanto profiláctica como curativa. Los empleados de instituciones penales y correccionales del Estado tienen derecho a que su ambiente de trabajo sea razonablemente saludable.

4) En las instituciones penales y correccionales se debe inaugurar un programa de control de la tuberculosis que debe incluir examen físico, películas radiográficas del tórax y pruebas a la tuberculina de todos los nuevos reclusos y empleados. Exámenes radiográficos torácicos anuales del personal entero de la institución debe formar parte del servicio médico sistemático.

5) Debe construirse un hospital central para el cuidado y tratamiento de casos activos de tuberculosis provenientes de las instituciones penales y correccionales. En cada institución se deben establecer pabellones de observación para aislar y diagnosticar a los casos de dudosa actividad.

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The Value of Electrocardiography

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The electrocardiograph is an instrument for the graphic registration of the heart beat. This is done by applying the electrodes of the electrocardiograph to the right arm, the left arm and the left leg of the individual to be studied. In recent years a fourth electrode has been used, and this is placed over the apex of the heart. The coupled electrodes of the right arm and the left arm are known as lead one (L_1); those of the right arm and the left leg are known as lead two (L_2); and those of the left arm and the left leg are known as lead three (L_3). The precordial lead or the electrodes connecting the apex of the heart and the left leg is known as lead four (L_4). There are a great many positions for this precordial electrode each one having a specific purpose in the investigation of cardiac disease.

The electrical action current associated with heart muscle contraction is picked up by these electrodes and brought back to the string of the galvanometer contained in the electrocardiograph. This particular string is suspended in an electromagnetic field, and the string in turn is interplaced between a light and a photographic film. Thus the string's shadow is cast upon a photographic film. Between the string and the photographic film is a timing device, so that when the record is taken, the various time components are recorded during the film exposure. The electrical current that enters the string galvanometer disturbs the electromagnetic field with the result that the string is deflected. This motion casts a shadow upon the photographic film and a tracing is formed. This tracing is known as the electrocardiogram and the science of producing this type of record is known as electrocardiography. The individual who interprets the electrocardiogram is known as an electrocardiographer. As a result of this graphic registration we obtain the accompanying type of record (Fig. 1). The record consists of a series of complexes made up of P waves, QRS waves, and T waves. There is no significance to be attached to the letters used in describing the complexes on the electrocardiogram. They were chosen because they had not been used heretofore in physiological experiments. The P wave represents the action current of the auricle, the QRS wave that of the ventricle, and the T wave the dying out of the current of action. In

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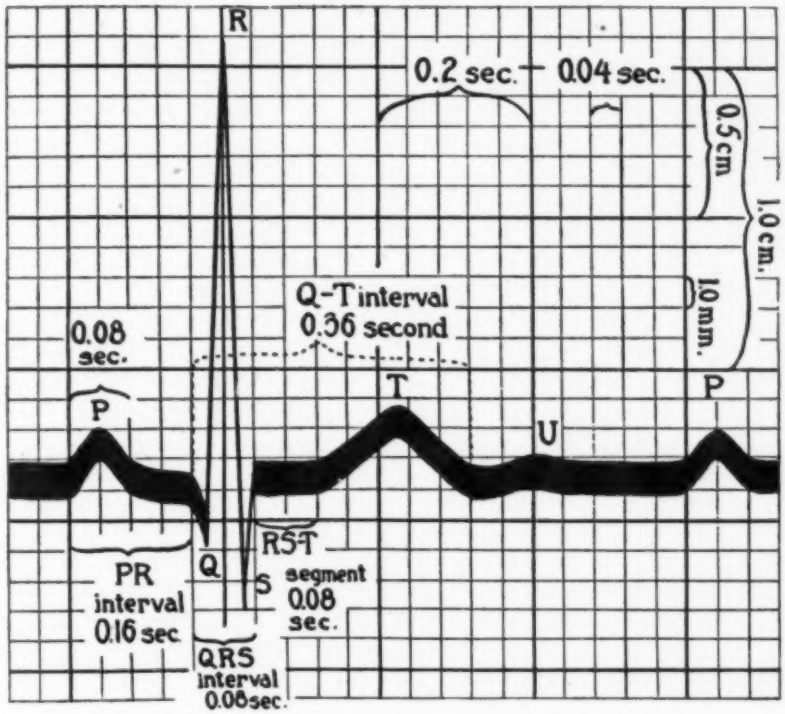
addition, the time required for the passage of this current through the various portions of the heart is registered upon the electrocardiogram. The time required for it to pass from the auricle to the ventricle is known as the PR interval and it should not exceed two tenths (0.2) of a second. The time required to pass through



the ventricle is known as the QRS interval, and it in turn should not exceed one tenth (0.1) of a second. A series of these complexes constitute the electrocardiogram. The record is further divided into those complexes that are obtained from lead one, lead two, lead three and those from the various precordial leads.

Once having obtained such a graphic registration of the cardiac cycle what information may we obtain from the record? We may obtain the following unequivocal information: (1) the rate at which the heart was beating at the time the electrocardiogram was taken; (2) the individual time components of the various complexes on the record; (3) the rhythm of the heart at the time the record was made, and (4) the presence or absence of normal complexes. It is when the complexes deviate from normal that an interpretation of the record becomes necessary, and it is at this time that clinical judgment and experience is essential. The complexes are altered whenever there is a disturbance of myocardial function. These disturbances may result from such con-

ditions as infection in the myocardium, impoverished blood supply to the myocardium, parasitic infectation in the myocardium or from metastatic tumors to the myocardium. It is possible for the record to be disturbed, whenever there is a disproportion between the muscle bulk of the left and right ventricles. More important, however, is the fact that the record may register myocardial changes that are extra cardiac in origin. Such phenomena may be present in thyrotoxicosis, myxedema, chronic gallbladder disease, duodenal ulcers and the like. It is obvious then that the electrocardiograph records only the cardiac cycle, and in doing so it also records altered complexes should there be a disturbance in the myocardium. The electrocardiograph, however, cannot tell us what produced the change in the myocardium, nor can it distinguish between the many things that can make such myocardial changes. It is true, that although a single electrocardiographic tracing may not be of significance, serial records are of inestimable value, for often the changes in the record or the patterns presented in the tracing may be sufficiently pathognomonic for the interpreter to accurately diagnose the cardiac lesion present. It is possible also that a great deal of damage may exist in both the right and the left ventricles, and so counteract each other that the electrocardiogram will be perfectly normal, and yet the heart can be abnormal from a clinical standpoint. The converse is also true, namely, that in a clinically normal heart, there may be marked electrocardiographic changes. From this, we may state that electrocardiographic heart disease does not represent clinical heart disease, and that severe forms of clinical heart disease can exist in association with a normal electrocardiogram. The electrocardiogram, therefore, cannot give us a prognosis concerning heart disease; it cannot tell us the functional capacity of the heart; and it cannot diagnose heart disease. All that we obtain from the electrocardiograph is a graphic record of the heart cycle. The value of this record is then dependent not only upon the electrocardiographer's skill in making the interpretation, but also upon his knowledge concerning the clinical course of the individual's illness. The electrocardiographer records what he sees in the electrocardiogram. Since it is possible that the interpretation of the recorded facts may not correspond with the clinical course of the patient, it is necessary for the physician to be able to apply and to evaluate the interpretation in terms of the clinical history and findings of the patient being studied.

SUMMARY

In conclusion, it may be stated that the electrocardiogram is a very valuable instrument to aid in the diagnosis and manage-

ment of patients with heart disease. Its value depends upon a skilled interpretation of the record as well as a careful and proper correlation of this interpretation with the clinical course of the patient being investigated. The instrument is not at any time a substitute for a well taken history, nor for a well made physical examination, and certainly it is not a substitute for other forms of laboratory procedure in the study of heart disease. It cannot replace clinical experience and clinical judgment. Further, it must be emphasized that electrocardiographic heart disease is not synonymous with clinical heart disease, and also that very severe clinical heart disease can exist in the presence of a perfectly normal electrocardiographic tracing. Although the electrocardiogram may be of inestimable value in the study of cardiac disease, it must still remain as an adjunct to the clinical study of such phenomena.

RESUMEN

En conclusión, se puede afirmar que el electrocardiograma es un instrumento valioso que ayuda en el diagnóstico y tratamiento de pacientes con enfermedad del corazón. Su valor depende de una interpretación perita del trazo y de la correlación cuidadosa y correcta de esta interpretación con el curso clínico del paciente que se está investigando. El instrumento nunca reemplaza a la historia bien tomada, ni al examen físico bien hecho; y ciertamente no reemplaza a otros procedimientos de laboratorio empleados en el estudio de enfermedades del corazón. Tampoco puede reemplazar a la experiencia y al juicio clínicos. Además, se debe recalcar que enfermedad electrocardiográfica del corazón no es sinónima a enfermedad clínica del corazón y, también, que puede existir muy grave enfermedad clínica del corazón cuando el trazo electrocardiográfico es perfectamente normal. Aunque el electrocardiograma puede ser de valor inestimable en el estudio de las cardiopatías, debe ser siempre un adjunto al estudio clínico de esos fenómenos.

Asbestosis:
VI. Analysis of Forty Necropsied Cases*

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During the past eighteen years the necropsy studies at the Medical College of South Carolina have included forty cases in which asbestosis of some degree has been encountered. In this period several reports[1-5] have been published.

Since various previous writings give extensive presentations of the industrial relations, clinical manifestations, roentgenological diagnosis and pathology of the disease, the scope of this paper will be limited to such additional information as may be gained in relation particularly to uncleared questions.

A division of these forty cases into three groups based upon the estimated grade of pulmonary fibrosis (Figs. 1, 2 and 3) is given in Charts I, II and III. So far as possible the duration of exposure has been ascertained but that important information is missing in many of the histories. Where possible it was supplied by the employer. All traced exposure was in an asbestos factory where prior to the time of recognition of asbestosis as an industrial hazard the working conditions were undoubtedly very dusty, but where dust control has been progressively improved in the last twenty years or so and where conditions for work are recently as good no doubt as technical circumstances will allow. In Chart I, covering cases of minor asbestosis, there is one conspicuous case (49037) of failure of history of exposure to fit the disease state. There is nothing to indicate that this man actually worked ten years in asbestos dust, and the history of ten years exposure must be doubted. In case 70964 a nodular fibrosis of the lungs was also present, in reality excluding the case from comparison. Case 15652 is included in the discussion of tuberculosis in the series. Otherwise this group showed only incidentally the finding of asbestosis. Even the employment which caused it escaped the history of the case.

In Chart II, listing cases of well developed but not advanced asbestosis, is encountered a conscious relation of the employment exposure in connection with the case, although really in most of

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these cases the history of the employment was traced out after the necropsy diagnosis. The shortest known exposure to cause this grade of lung fibrosis was twenty-eight months during an elapsed three years. The fibrosis was naturally of recent formation. In general the advance of the disease and the age of the lung fibrosis parallels the duration of exposure and the length of time since

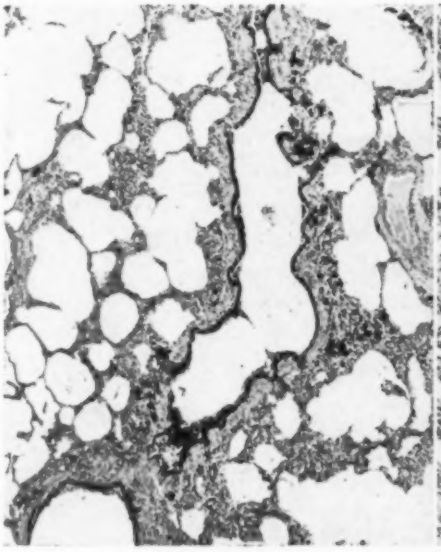

FIGURE 1

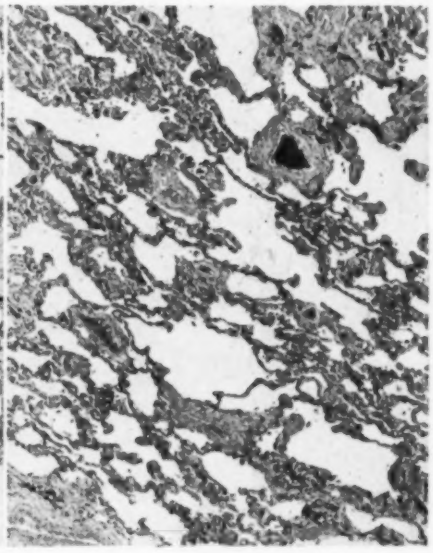

FIGURE 2

Figure 1: Grade 1 asbestosis. Human lung, X 75.
Figure 2: Grade 2 asbestosis. Human lung, X 75.

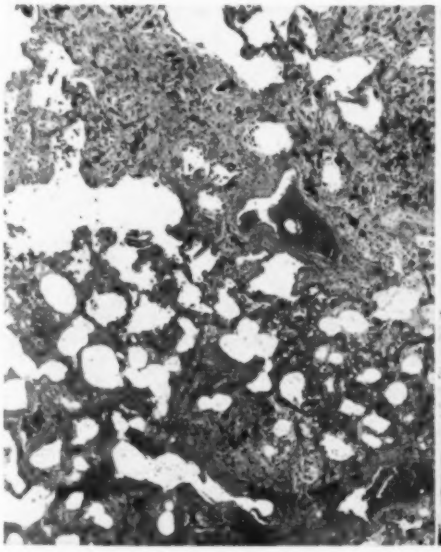

FIGURE 3

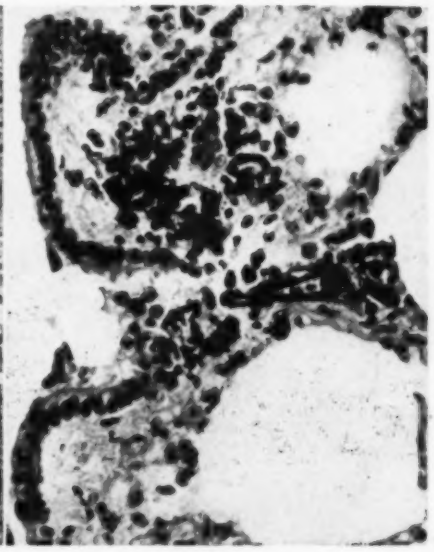

FIGURE 4

Figure 3: Grade 3 asbestosis. Human lung, X 75.—*Figure 4:* Asbestosis bodies located in terminal bronchiole and vestibular area. Human lung, X 525.

CHART I — MINOR GRADE — 12 CASES

No.	Sex & Age	Exposure	Asbestos Bodies	FIBROSIS Old	FIBROSIS Recent	FIBROSIS Nodular	FIBROSIS Pleura	Major Disease
10672	M 32	No Data	++	.....	+	.....	++	Encephalitis, Acute
11726	M 50	No Data	+	+	+	.....	+	Aortic Insufficiency, Cor. Sclerosis
12892	F 29	No Data	++	.....	+	.....	+++	Pulmonary Tuberculosis
15652	M 32	No Data	+	+	+	.....	.....	Typhoid
20532	F 80	No Data	+	+	.....	.....	.....	Arterioscl. Gangrene of Feet
30514	M 35	No Data	++	+	.....	.....	.....	Arterioscl. Cerebral Hemorrhage
30678	F 35	No Data	+	+	.....	.....	+	Sarcoma of Uterus
36007	M 45	No Data	+	+	.....	.....	+	Drowned
48619	F 36	No Data	+	.....	+	.....	.....	Carcinoma of Groin
49037	M 28	10 yrs. ?	+	?	?	.....	.....	Endocarditis
70964	M 50	No Data	++	+	+	++	++	Arterioscl., Pneumonia
50454	M ?	No Data	+	.....	+	.....	.....	Injury

CHART II — MEDIUM GRADE — 14 CASES

No.	Sex & Age	Exposure	Asbestos Bodies	FIBROSIS Old	FIBROSIS Recent	FIBROSIS Nodular	FIBROSIS Pleura	Major Disease
9647	M 40	28 mos. in 3 yrs.	++	.....	++	.....	.....	Gunshot
10944	F 40	No Data	+	++	.....	.....	+++	Pelvic Abscess
11511	F 55	No Data	++	+	++	.....	+	Cor. Sclerosis
11613	M 62	No Data	+	++	++	.....	.....	Arterioscl. Cerebral Hemorrhage
11837	M 40	No Data	+++	++	++	.....	.....	Carcinoma of Neck
11967	F 45	No Data	++	++	.....	+	++	Arterioscl.
17726	M 44	No Data	+++	++	?	.....	.....	Mesenteric Thrombosis
18062	F 65	No Data	++	++	+	+	+++	Aortic Aneurysm
20186	F 36	4 yrs. 14 yrs. before	+	++	+	.....	+	Aortic Aneursym
22047	M 30	4 yrs. 3 yrs. before	+++	+	++	.....	+++	Pulmonary Tuberculosis
25237	M 45	13 yrs. 3 yrs. before	++	++	.....	+	++	Pulmonary Carcinoma
46916	M 37	No Data	++	++	.....	+	.....	Aneurysm
47715	M 37	10 yrs. 1 yr. before	++	++	.....	.....	.....	Gunshot
66100	M 50	22 yrs. 1 yr. before	+++	++	++	.....	+	Pulmonary Carcinoma

CHART III — ADVANCED GRADE — 14 CASES

No.	Sex & Age	Exposure	Asbestos Bodies	FIBROSIS Old	FIBROSIS Recent	FIBROSIS Nodular	FIBROSIS Pleura	Major Disease
9676	M 30	4½ yrs.	+++	+	+++	.....	+	Pneumonia
10392	M ?	11½ yrs.	++	+++	+	+++	+++	Pulmonary Fibrosis
11599	F 25	No Data	+++	+++	++	.....	+	Pellegra
12192	F 30	No Data	+++	+++	+++	+	+++	Pulmonary Tuberculosis
17620	M 38	No Data	+++	+++	.....	.....	.....	Hypertensive Disease
19094	M 45	10 yrs. 4 yrs. before	+++	+++	+	+	+++	Pulmonary Fibrosis Tuberculosis
20514	M 57	20 yrs. 1 yr. before 22 yrs. cottonmill	+++	+++	.....	++	++	Pulmonary Carcinoma Fibrosis
22674	M 55	4 yrs. 11 yrs. before	+++	+	+++	+	+	Syphilitic Aortitis Pneumonia
24693	M 45	No Data	+++	++	+++	.....	.....	Glomerulonephritis, Chronic
25145	M 35	½ yr. 10 yrs. before	+++	+++	.....	.....	+	Hypertensive Disease
27000	M 55	13 yrs. 3 yrs. before	+++	++	+++	.....	+	Cor. Sclerosis; Lipoid Pneumonia
83512	F 35	No Data	+	+++	.....	.....	+	Lung Abscess
109411	M 38	3 yrs. 13 yrs. before	+	.....	+++	.....	++	Pyelonephritis
147595	F ?	? prior to 1920	+++	+++	.....	.....	.....	Pulmonary Fibrosis

its beginning. Also the prominence of asbestosis bodies in the lungs is generally consistent with the duration of exposure. In this group appears two of the three cases of cancer of the lung which are especially presented in another place. There is no other indication in this chart that asbestosis of this degree is directly or indirectly responsible for death of the subject.

In Chart III, showing data on the fourteen advanced cases of the series, is seen the first positive evidence of the direct killing effect of the disease. At least four of the cases show a major part played by pulmonary fibrosis in the death of the individual. In the few cases where other factors responsible for the appearance of recent cellular fibrosis of the lungs could be ruled out, there is evidence to support Gardner's[6] experience with experimental asbestosis in guinea pigs that the fibrous disease does not progress indefinitely after cessation of exposure. There are five cases of known but not recent exposure, for instance cases 147595 and 25145, Chart III, showing advanced old fibrosis but none recent. There are twelve cases all told showing old but not fresh fibrosis. On the other hand, recent exposure, no matter of how long the duration, characteristically shows fresh fibrosis (see cases 9676 and 10392, Chart III).

The "Asbestosis Body"

The so-called asbestosis body has become a characteristic element in human asbestosis and is also found in the lungs of some animals which have been the subjects of experimental asbestos dust exposure[6] but not in others. It consists of a central asbestos fibre with a shiny yellow-brown coating appearing in a variety of architectural forms. Similarly coated bodies of smaller size may be found in silicosis and in miscellaneous occurance of no apparent relation to asbestos dust exposure.[4]

The location of asbestosis bodies (Fig. 4) in the terminal bronchioles and in the vestibular area of the lobule is significant in the pathogenesis of the disease. Those of smaller size appear in the peribronchial lymph nodes, where there is foreign body reaction but usually little if any fibrosis.

Time will not here permit full discussion of all matters of interest about these bodies. From previous publications it may be said that their formation is not an essential in the pathogenesis of experimental asbestosis in some animals although it is a characteristic microscopic feature in the naturally occurring human disease. Injury to the lung by the asbestos fibre occurs experimentally before the coating deposits in some animals[7] and without it altogether in others. It appears that the coating may be a defensive occurrence, segregating the fibers from direct tissue

contact. From study of the history of these cases it is apparent that these bodies remain deposited in the lungs more or less permanently, at least for as long as twenty-seven years (Fig. 5, case 147595, Chart III). That they undergo slow but definite change is also apparent.[3]

Findings of these bodies in the sputum is indicative of nothing more than the fact of previous inhalation of asbestos, not of the condition of the lungs. They are usually more numerous in cases of current or recent long exposure. They may be found for years after the cessation of such exposure, but in even advanced asbestosis of long duration they may not be found at all or only in sparse numbers. Since nothing valuable is to be gained from lung puncture for examination of pulmonary material for these bodies that cannot be obtained by simpler measures, there seems to be no justification for that procedure as a measure to be used in diagnosis.

Pleural Fibrosis

One of the outstanding features of disease encountered in advanced asbestosis is pleural thickening and more or less adhesive obliteration of the pleural space. Since the deposit of asbestos dust does not reach into the pleura, the reason for pleural fibrosis is not clear.

That it is not an essential of the disease state is shown by some of our cases. That it may be a secondary condition, possibly of

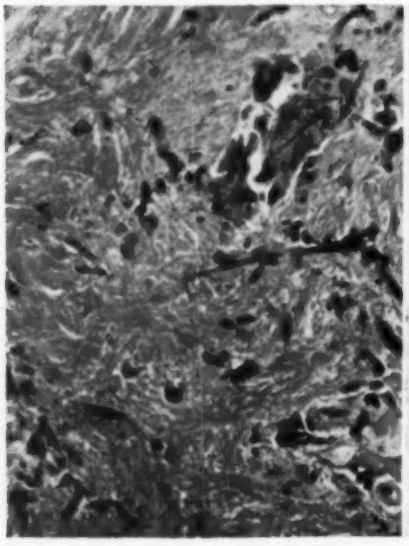

FIGURE 5

FIGURE 6

Figure 5: Asbestosis bodies within old fibrous and almost obliterated air spaces, from exposure 27 years previous (147,595). Human lung, X 525.—*Figure 6:* Grade 3 asbestosis (147,595). No pleural fibrosis.

basis in intercurrent or secondary infection is indicated by other cases. In case 147595, Chart III, for instance, although there was heavy asbestos deposit and associated advanced grade of old fibrosis from exposure known to have terminated twenty-seven years before death, apparently from asbestosis itself, the pleural area was quite normal (Fig. 6). In sixteen of the forty cases there was no pleural fibrosis; even in six of the advanced cases there was none. In ten of those showing pleural fibrosis, there was some other lung disease upon which the pleural state may be blamed.

Nodular Fibrosis

In one of our previous reports[2] is cited a case (10392) of fatal fibrosis of the lungs from eleven and one-half years asbestos dust exposure. Associated with general pulmonary fibrosis in this case was the occurrence of localized hyaline nodules of scar tissue resembling silicosis. From the exhaustive history obtained in long observation of this man before he died, no exposure to silica dust was uncovered.

Later[3] we reported a case of carcinoma of the lung in advanced asbestosis which also showed silicosis type hyaline fibrous nodules within which were shown asbestosis bodies. In that report we used the term "asbestosilicosis." The subject concerned had worked in an asbestos factory for twenty-one years and previously in a cotton mill for twenty-two years.

All told, our series contains eight cases in which nodular fibrosis occurs, five in the advanced group, two in the medium group, and one among those of minor grade. Gloyne[9] also records and illustrates the occurrence of nodular fibrosis "resembling the silicotic whorl."

Although the reason for this prominent appearance of nodular fibrosis in our cases is not clear, we have previously assumed that an unknown silica dust exposure probably was involved.

However, the question of possible occurrence of nodular fibrosis in asbestosis is again raised by King, Clegg and Rae,[8] who report that nodular fibrosis of the lungs occurred from experimental intratracheal injection of rabbits with asbestos fibre of fifteen or more microns in length, while diffuse fibrosis resulted from similar injection of fibre of 2.5 microns length. This is not in accord with Gardner's[6] findings of wholly non-nodular diffuse fibrosis of the lungs in guinea pigs from inhalation of asbestos dust consisting of long fibre and practically no effect from dust of asbestos ground to eliminate long fibres. In experimental asbestosis of rabbits and guinea pigs there is the additional difference that similar, although smaller, asbestosis bodies are formed in the lungs of the latter but not in the former. King and his asso-

ciates thought that certain black pigment associated with the asbestos fibre in rabbit's lungs might represent a comparable formation. Since there are other indications of difference in response of different species to asbestos dust in Gardner's experiments, this question will have to be subjected to further examination before it can be proven that nodular fibrosis of the lungs may not occur in natural asbestosis of human beings.

Carcinoma of the Lung in Asbestosis

In 1935, we[3] made a report of the occurrence of carcinoma of the lung in a case of asbestosis. Prior to that time there had been no particular reference to that disease in relation to dust exposure except, as there recalled, among the workers in the mines of the Erz mountains in Bohemia and Saxony. Published papers were cited laying suspicion upon radium examination and upon arsenic in the ore concerned. By 1939, when we reported a second, a total of eight cases of carcinoma of the lung in asbestosis had been recorded.

In various published papers in the meantime, additional cases have been reported and discussions made (see Gloyne,[10] Egbert and Geiger,[11] Nordman,[12] Anderson and Dibble,[13] Vorwald and Karr,[14] Klotz,[15] Halleb and Angrist[16] and Homburger[17]) some of which indicate a relationship of carcinoma of the lung to asbestosis and to silicosis, and some of which argue to the contrary.

In our necropsy service has been encountered an additional case, making a total of three in forty cases of asbestosis during a period of eighteen years. This incidence of 7.5 per cent is to be compared with a general incidence of 1 per cent of carcinoma of the lung in 2,683 necropsies in the last ten years. Of further interest in the question is the fact that each of our three cases had medium to advanced grades of asbestosis.

In addition to these necropsies we have recently had a case proven to be carcinoma of the lung by bronchoscopic biopsy in a man who had been exposed to asbestos dust irregularly for twenty years and who showed asbestosis bodies in his sputum. It may be interesting to compare this record with that of the experience of Klotz,[15] who reported four cases of carcinoma of the lung in fifty subjects of silicosis during eleven years, an incidence of 8 per cent, while in a total of 4,500 autopsies during the same period the incidence of lung carcinoma was only 1.18 per cent.

Apparently to the present there are at least sixteen necropsied cases of carcinoma of the lungs in asbestosis, which, considering the comparatively small necropsy experience in the disease, seems excessive. From reports of the natural occurrence and from the question raised by experimental evidence, it seems that continued

effort, especially experimental, should be made to elucidate this important problem.

Tuberculosis in Asbestosis

The question of whether asbestosis favors the development or progress of tuberculosis gains little evidence to support the affirmative here. Certain British reports indicate a high tuberculosis rate among asbestos workers and others do not. No acceptable proof of the contention in the form of properly controlled studies comparing tuberculosis in other groups of people living under a similar condition to the asbestos workers has been offered. On the other hand, Gardner reports from his experimental work that no influence upon tuberculosis occurred from asbestosis, and from surveys of asbestos workers no unusual incidence of tuberculosis has been found.

In our own series, from superficial analysis it might appear that tuberculosis had been favored by the condition. Six of the forty showed some form of active tuberculosis, an incidence of 15 per cent, while the incidence of occurrence of active tuberculosis in 2,683 necropsies during the same period was but 5 per cent.

A careful analysis of the individual cases, however, reveals that only four of the eight had active tuberculosis of the lungs. One of these (12192) had an advanced grade of pulmonary fibrosis showing the nodular localization characteristic of silicosis, which condition is well accepted as favoring the development of tuberculosis. Another (12892) had only a minimal and early grade of asbestosis. Of the other two, one (22047) exhibited a medium grade of asbestosis and one (19094) an advanced degree of old diffuse fibrosis.

SUMMARY

Forty necropsied cases of human asbestosis have been analyzed and certain findings related to uncleared questions are here presented.

In this series occurs evidence that the disease does not progress beyond a limited time after exposure to asbestos dust ceases, although the fibrosis caused persists and ages into dense scar tissue. In minor grades of the disease, there is little to indicate any recognizable influence. Characteristically some other unrelated condition caused the fatal disease. In practically all such cases the state of asbestosis was undiagnosed until disclosed at necropsy. This was likewise true in most of those of medium grade lung damage. Only in advanced form was asbestosis a conspicuous state and in only a part of those of that grade was it a major event or the sole factor in the fatal disability.

Asbestosis bodies remain deposited in the lung indefinitely, at least as long as twenty-seven years. In old deposits they show some evidence of change. Smaller forms do occur in peribronchial lymph nodes.

Pleural involvement as a part of the disease is not constant nor essential. It is indicated as of secondary occurrence.

Local fibrous nodular lesions comparable to those characteristic of silicosis occurred in such prominence as to question whether they may not also be produced by asbestos.

Carcinoma of the lung was also of such prominence as to require continued consideration as possibly inducible in a susceptible subject by severe asbestosis until disproven by further investigation.

Although tuberculosis of the lungs occurred with more frequency than in the general necropsy series, careful analysis of pertinent evidence does not add much weight to the idea of relationship, while some evidence occurred that improvement of tuberculosis may proceed in the face of advancing asbestosis in at least one case.

RESUMEN

Se han analizado cuarenta casos autopsiados de asbestosis humana y se presentan aquí algunos hallazgos relativos a ciertas cuestiones aún no aclaradas.

Ocurren pruebas en esta serie de que la enfermedad no progresa sino por un tiempo limitado después de haber cesado la exposición al polvo de asbesto, aunque la fibrosis producida persiste y se convierte en cicatrices espesas. En grados menores de la enfermedad, hay poco que indique alguna influencia reconocible. Generalmente alguna otra condición distinta causó la enfermedad fatal. En casi todos esos casos la asbestosis pasó desapercibida hasta que se descubrió en la autopsia. Fue esto cierto también en la mayor parte de los casos en los que el daño al pulmón fue de grado mediano. Solamente en la forma avanzada fue las asbestosis un estado conspícuo, y sólo en parte de los casos de ese grado fue el suceso principal o el único factor en la incapacidad fatal.

Los cuerpos de asbestosis quedan depositados indefinidamente en el pulmón, por lo menos por veinte y siete años. En depósitos viejos se notan algunos signos de alteración. Pequeñas formas sí ocurren en los ganglios linfáticos peribronquiales.

La invasión de la pleura como parte de la enfermedad no es ni constante ni esencial y cuando ocurre es un hallazgo secundario.

Lesiones nodulares fibrosas locales, comparables a las que son características de la silicosis, ocurrieron con tal prominencia que despertaron sospechas de que quizás puedan ser producidas también por el asbesto.

El carcinoma del pulmón también ocurrió con tal prominencia que no se debe abandonar la posibilidad de que sea producible en un sujeto sensible por la asbestosis grave, a menos de que sea refutado esto por investigaciones ulteriores.

Aunque la tuberculosis pulmonar ocurrió con más frecuencia que en la serie general de autopsias, el análisis cuidadoso de los datos pertinentes no apoya la idea de que exista alguna relación entre estas dos enfermedades, mientras que, por lo menos en un caso, hubo datos que indicaron que la tuberculosis puede seguir mejorando aún cuando la asbestosis continúa avanzando.

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Discussion

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Prior to 1930 there was almost no mention in American medical literature of any specific disease due to asbestos. In the British and French literature, authors recorded high frequency of chest

symptoms among asbestos workers and speculated on the relation of symptoms to the inhalation of asbestos or of silica or of iron or to other conditions associated with asbestos work. There were reports of a high tuberculosis morbidity among those exposed, and general high mortality. Some authors gave fair descriptions of the pathology or of the clinical picture of what we now call asbestosis but correlation of the pathology, roentgen appearance and the essential factor in etiology was lacking. There was consensus, however, that somehow asbestos work was harmful. The international encyclopedia on industrial diseases, entitled "Health and Occupation," published in 1930, deplores the lack of more accurate and detailed data on the asbestos hazard, and goes on to say that the increasing utilization of asbestos urgently calls for study of the condition.

In 1930, Lynch and Smith published the first necropsy protocol together with the detailed occupational history which left no doubt that the disease is a lung fibrosis and is directly due to the inhalation of the asbestos in the dust. R. S. Mills, in the same year, and later, Lanza, Gardner, McConnell, Pendergrass, Shull, Sparks, Stone and others made important contributions. In the seventeen years since that confession of confusion in the encyclopedia and Dr. Lynch's pioneer publication, American medicine has progressed with speed in the knowledge of this condition.

Today, we have had the privilege of hearing the latest report of the continuing observations by Dr. Lynch. Some problems, he tells us, need further elucidation, among them, the relation to carcinoma. Although we must keep an open mind, the evidence warrants the *tentative* conclusion that asbestos workers do have a higher incidence of lung cancer. Now that early lung cancer often is amenable to surgery, this gives added value to the periodic chest x-ray survey among these workers and calls for more meticulous film interpretation than is essential in most survey work.

From the viewpoint of public health, of diagnosis, and of workmen's compensation adjudication, observation is needed to establish the etiologic relation or the absence of any relationship between tuberculosis and asbestosis. Many of the older clinical observations (though not all) favored the conclusion that there is a relationship similar to that between silicosis and tuberculosis. The report we have heard today does not confirm this view. One statement, or rather the implication of one statement, of Dr. Lynch must be interpreted in the light of other clinical experience. Dr. Lynch reported one case in which tuberculosis improved in the face of advancing asbestosis. However, we occasionally find tuberculosis improving in spite of the presence of silicosis and we do know that silicosis adversely affects tuberculosis. Tuberculosis sometimes

heals under the most unfavorable conditions of the infected organ. That tuberculosis may heal in the face of asbestosis, therefore, should not add any weight to *either* side in evaluating the effect of asbestosis on tuberculosis.

Dr. Lynch may not be conscious of a sermon to the clinician contained in his post-mortem reports. He said that in most of the well-developed, though not in advanced cases, the history of asbestos exposure was traced *after* necropsy diagnosis. To me, that means that the clinicians neglected the occupational histories of their patients, probably because there was another serious disease present. That the diagnosis was made post-mortem suggests there were not enough routine chest films made of these workers when they were well and certainly not sufficient chest examination when they became ill. We should take to heart this failure to recognize the occupational disease during life. Many new substances were introduced in industry in the last decade; new compounds known only to the chemist today will be used in industry tomorrow. Some of these substances may produce chest symptoms. The *clinician,* practising in the locality of the industry, and not the pathologist should be the first to clearly state that an industrial process is a health hazard. The *clinician* must be the first to know, what is equally important from a health viewpoint, that some suspected industrial process *is not* a health hazard. Let us reflect on the significance of the fact that twenty years ago hardly one of us would have suspected that the lung symptoms presented by one of our patients working on refrigerator insulation were directly due to asbestos. Perhaps today some of us are missing the etiologic factor in cases that now are under our observation because we neglect the occupational history. Dr. Lynch's studies on the pathology would be of only passing interest if he had not combined them with investigations into the occupational history in each individual case. It is the correlation which makes them a major contribution to medicine.

There are other conclusions of Dr. Lynch's applicable to problems of the clinician. Dr. Lynch finds indications that when exposure ends the disease develops but little further. The prognosis, therefore, is definite, and that must be a comfort to the victim that makes it easier to get him readjusted to a new occupation and makes Workmen's Compensation adjudication much simpler. Dr. Lynch is speaking, of course, of the fibrosis; his statement must not be applied to the secondary cardiac embarrassment once that has begun. That may progress even without exposure. If I misinterpret Dr. Lynch's conclusion I trust he will emphatically correct me. The pathologic finding that fibrosis persists and ages into scar tissue explains the outstanding physical sign of the disease,

limitation of chest expansion and also means that no recession of symptoms or signs directly related to the fibrosis is to be expected.

Another finding is that length of exposure and severity of the disease are correlated. This sounds self-evident but in silicosis we cannot make that statement. This characteristic should enable us to concentrate and strengthen asbestosis case-finding among those workers who need it most, i.e., those with long exposure, and to be alert when examining a patient who declares: "Oh no, that dust does not bother me, I'm used to it, worked there without trouble for twenty years." Furthermore, this correlation of exposure-time with severity enables a workmen's compensation board to equitably allocate liability when two or more employees with asbestos hazards are involved in the same case. Then, too, Dr. Lynch's conclusions mean that when we have negative medical findings on a patient exposed for only a few months we can reassure him with confidence on the absence of dust disease.

As if to balance these conclusions which make our jobs easier, the newer observations indicating that nodular fibrosis may occur in asbestosis makes matters more complicated. Now, knowing that nodulation occurs in asbestosis not only the pathologic but also the roentgenologic distinction from silicosis becomes more blurred. We must be more cautious or perhaps, give up trying to reason from a film or a pathologic finding as to the type of dust exposure.

This has been an informative presentation. It necessarily is an unusual privilege to be first to hear repots of pioneer investigation from men whose publications have their place in the history of diseases of the chest. I want to express my thanks to Dr. Lynch for that privilege today.

Discussion

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I wish to compliment Dr. Lynch on the contribution he has made to our knowledge of asbestosis.

Pulmonary asbestosis differs from silicosis by size, etc., of the particles inhaled and by chemical composition. Asbestosis is caused by an alkali which is magnesium silicate, along with calcium and iron. In silicosis the offending dust particle is silicon dioxide. In asbestosis the shape of the particle causes them to be arrested more often in the bronchioles and the alveoli anl they are not so

readily transported into the lymphatic system. Due to these facts pulmonary asbestosis gives a different pathological and radiological picture than that of silicosis.

The sputum in silicosis reveals no diagnostic characteristic while in asbestosis characteristic asbestosis bodies are found. Earlier in the course of the disease the x-ray findings in asbestosis are similar to those of silicosis, however, as the disease advances asbestosis gives the appearance of a ground glass opacity with involvement of the costophrenic angles while in silicosis the later stages show increased nodulation without the ground glass appearance and the costophrenic angles clear.

Velocity of Ether Absorption from Visceral Pleura: Pleura-to-Tongue Circulation Time*

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The visceral pleura and its ability to absorb matter either liquid or particulate has been demonstrated.[1] These studies dealt with the site and character of absorption, rather than with the readiness with which the injected material is removed.[2] In the present communication are certain observations on the velocity with which ether in sterile isotonic solution of sodium chloride placed on the visceral pleura is absorbed and the time required for the same to be tasted. The required time is named the pleura to tongue circulation time, knowing that readily diffusible substances are absorbed directly into the blood vessels.[3]

Material and Method of Study: Eighteen patients receiving artificial pneumothorax for pulmonary tuberculosis were selected for this study. In all, excepting patients No. 9 and 18, the disease was quiescent. With care for asepsis, 0.3 cc. of ether, and 0.3 cc. of isotonic solution of sodium chloride were drawn into a 2 cc. syringe. After shaking the contents gently five or six times, the solution was dropped directly upon the surface of the visceral pleura through a 20 gauge needle, not taking more than two seconds to do so. The needle for this procedure was inserted in the fourth intercostal space at the midaxillary region. The point of the needle was held at a right angle to the projected spot of the pleural surface to be deluged. Care was taken to prevent the ether from coming in contact with the parietal pleura because when this occurred, the patient felt pain in the thoracic wall. Furthermore, the ether in isotonic solution of sodium chloride was intended to be absorbed by the intrapulmonary vessels and not by the vessels of the thoracic wall.

In nine patients, the velocity of absorption of the right lung was studied, and in the rest that of the left lung. The interval between the instillation of the solution and the tasting of ether by the patient is timed and regarded as the velocity of ether absorption or the pleura-to-tongue circulation time.

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Findings and Discussion:

The procedure in this study was entirely harmless in all.

The velocity of the absorption of ether varied considerably in the series studied. The most rapid pleura-to-tongue time was two seconds in two patients, but in the majority, it varied between forty to seventy seconds (Fig. 1). It seems that the variation was

FIGURE 1

Case No.	Age	Sex	Duration of Pneumothorax	Side of Pneumothorax	Pleura to Tongue Circulation Time In Seconds
1	28	F	5 years	Right	10
2	29	F	2½ "	"	25
3	32	F	5 "	"	30
4	26	F	1 "	"	40
5	25	M	4½ "	"	45
6	36	M	4 "	"	45
7	43	M	4 "	"	55
8	45	M	6½ "	"	60
9	20	M	3 months	"	60
10	34	F	2½ years	Left	2
11	33	M	3 "	"	2
12	19	F	2 "	"	40
13	39	M	3 "	"	45
14	39	F	3½ "	"	60
15	27	M	6 "	"	60
16	27	M	3 "	"	60
17	26	M	3½ "	"	70
18	23	M	3 "	"	70

primarily due to the different degrees of pleural thickening in these patients. Pleural thickening was a constant occurrance in artificial pneumothorax both in animals[4] and men.[5] It would seem that the thicker the pleura, the slower the absorption would be. Therefore, in those with a normal pleura and satisfactory pulmonary circulation, the velocity of the absorption of ether may be faster. The sex, age, duration of the pneumothorax, intrapleural pressure, and effusion as such do not appear to be the determining factors in the velocity of the absorption.

The most rapid absorption occurred in two patients (No. 10 and

11) with left-sided pneumothorax. It was suggested that the absorption of readily diffusible or particulate matter from the left pleural cavity may be faster than that from the right on account of the stronger impact of the heart action upon the left lung.[6] The comparative infrequency of left sided hydrothorax in congestive heart failure may be in part due to the same factor. Additional studies on those patients without pleural thickening are necessary to be certain of this question.

Four patients smelled the ether about one or two seconds before they tasted it. This suggests that the ether, after it is absorbed through the pleura, enters both the pulmonary blood vessels and bronchial system. In the presence of a bronchopleural fistula, large enough to be clinically significant, the patients smelled the ether within 2 seconds after it was dropped into the pleural cavity. It would be of interest to determine the velocity of obsorption in health as well as in congestive heart failure, consolidation, atelectasis, pulmonary hypertension, and other allied affections.

SUMMARY

When 0.3 cc. of ether and 0.3 cc. of isotonic solution of sodium chloride were dropped upon the visceral pleura, the ether was tasted in forty to seventy seconds by thirteen of the eighteen patients studied. In two patients, with the least degree of pleural thickening, the ether was tasted in two seconds. One tasted it in ten seconds, one in twenty-five seconds, and one in thirty seconds. The thickness of the pleura was considered a major determining factor in the velocity of the ether absorption. The procedure was harmless in all.

RESUMEN

Cuando se introdujeron en la cavidad pleural, 0.3 cc. de éter y 0.3 cc. de una solución isotónica de cloruro de sodio trece de los dieciocho pacientes estudiados saborearon el éter de cuarenta a setenta segundos después. Dos pacientes que tenían el menor grado de engrosamiento pleural saborearon el éter en dos segundos. Uno lo probó en diez segundos, otro en veinticinco segundos y un tercero en treinta segundos. Se opinó que el espesor de la pleura fue el factor principal que determinó la velocidad de la absorción del éter. Fue inocuo el procedimiento en todos los pacientes.

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Parasitic Infections of the Lung*

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A great variety of disease-producing organisms cause significant pathologic changes in the human respiratory tract. Strictly speaking all of these agents are parasitic in that they invade the host's tissues, live at his expense and induce more or less characteristic reactions. The roles of various bacteria are well understood. In recent years attention has been increasingly directed to certain pathogenic fungi which have been identified as the etiologic agents of pulmonary disease. These latter conditions are now reasonably well known. Much less well-known, however, are the lesions and the clinical syndromes produced by invasion of the respiratory system by certain protozoan and metazoan parasites. This is not unexpected since certain of these organisms are restricted to the tropics and the subtropics; others, because of their requirements for specific intermediate hosts not indigenous to the North American continent, are rarely encountered in conventional practice in the United States; and still others not uncommon among rural populations, especially in the south, are not endemic in other areas where climatic factors or the highly developed sanitation of urban centers interrupt the cycle of transmission.

It is probable that certain of these infections will be seen more commonly in the future, occurring predominantly in four groups of patients; individuals who have left rural areas to undertake urban occupations; veterans who have seen extended service in certain of the theaters of war; American personnel employed in endemic areas abroad; and finally foreigners visiting the United States from similar endemic regions. Diagnosis will frequently depend upon geographical medicine—knowledge of the distribution of particular parasites and the travels of the particular patient.

Two species within the Phylum Protozoa may be responsible for pathologic changes in the lung: *Plasmodium falciparum* the etiologic agent of aestivo-autumnal or falciparum malaria, and the pathogenic intestinal protozoan *Endameba histolytica*.

Plasmodium falciparum infections in the United States are limited to the deep south because of the strict temperature

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requirements of the parasite. This form of malaria, however, is widely disseminated throughout the tropics and infected individuals travelling by air may easily reach communities in the temperate zone within the limits of the incubation period. Fortunately this highly dangerous disease can be cured by specific therapy and does not exhibit the repeated relapses characteristic of the other types of malaria. For this reason it is not seen among veterans.

The pathogenic potential of *Plasmodium falciparum* depends upon certain particular characteristics of the host-parasite relationships which are not shared by the other species of malaria plasmodia. The asexual forms of this parasite invade the red blood cells irrespective of age. Consequently there is no limiting factor to prevent progressively increasing parasitemia. They likewise induce physical changes in the infected erythrocytes which contribute importantly to the pathology of the infection. The cells agglutinate, forming thrombi and emboli. They likewise adhere to capillary endothelium. These effects produce capillary obstruction, severe ischemia in many tissues of the body, determining the clinical syndrome. In the lungs this process may produce a true malarial pneumonitis with bloody sputum containing many parasitized red blood cells, or an interstitial type of reaction. In the course of a single year some 3.7 per cent of all malaria patients admitted to a military hospital in Panama presented either a malarial pneumonitis or a complicating "viral" or bacterial infection of the lungs.[1,2]

The *Endameba histolytica* has a widespread and cosmopolitan distribution because of the resistance of the infective encapsulated stage to adverse factors of the environment. The incidence of amebiasis varies directly with the general level of sanitation, from an average of 9.8 per cent in the United States to 50 per cent or higher in certain areas of the tropics and sub-tropics. In contrast to the experience with malaria during the war this infection was a relatively unimportant cause of hospitalization of our service personnel. This may well prove a misleading observation, however, since the development of clinical disease is determined by many factors, important among which are strain variations of virulence.[3] Furthermore, infection may remain latent for prolonged periods and then produce vague but important degrees of chronic ill health. This I am seeing frequently among veterans, many of whom give no antecedent history of dysentery or diarrhoea.

Although this parasite affects predominantly the proximal portion of the colon, serious disease of the lung may occur as a complication. The *Endameba histolytica* is a strict parasite invariably invading the host's tissues irrespective of the presence

or absence of clinical signs of infection. In the course of this invasion organisms not infrequently gain access to the venous systems and are transported to the liver or less commonly to the lung and other organs.

Next to the intestine or the liver, the lung is the organ most frequently invaded. Pulmonary involvement may be secondary to an hepatic abscess perforating through the diaphragm or it may occur independently. In the latter instance the amebae reach the lung parenchyma through the hepatic vein and the pulmonary arteries. Irrespective of the route of invasion the pathologic changes are similar. There is extensive destruction of tissue spreading centrifugally. Extensive pleural effusion develops as the process approaches the periphery of the lung. Ultimately the abscess may rupture into the pleural cavity or open into a bronchus. In the latter instance evacuation of the contents produces the characteristic anchovy-sauce-like sputum.

Pulmonary amebiasis is accompanied by the signs of severe infection and toxemia. Although the infecting organisms are easily eliminated by emetine hydrochloride, extensive destruction of the parenchyma or invasion of the pleura may lead to prolonged illness and may require radical surgical intervention after effective amebicidal therapy.

Members of two phyla of the metazoa, or multicellular organisms, may produce lesions in the respiratory system of man. One of these, the Nemathelminthes or round worms, includes four members capable of producing pulmonary disease. These are the hookworm, the large round worm *Ascaris lumbricoides, Strongyloides stercoralis,* and *Trichinella spiralis.* All of these are endemic in the United States. The first three are widely prevalent throughout the tropics and the subtropics, and are not uncommon infections in returned service personnel. Severe lesions of the respiratory system, however, are relatively uncommon and are generally acute and transitory.

The pathologic changes produced by hookworm infection occur only in the very early stages in the course of the migration of the infective filariform larvae from their portal of entry through exposed skin areas. These larvae gain access to the subcutaneous vessels and are transported in the blood stream to the lungs where they leave the capillaries actively penetrating the alveolar walls. After reaching the alveoli they migrate up the bronchial tree to the pharynx and thence down the oesophagus to the upper small intestine where they develop to maturity.

The migration of the larvae from the pulmonary capillaries into the alveoli produces minute hemorrhagic lesions in the parenchyma. In heavy infections these may be numerous and may be

accompanied by cellular infiltration. There may be extravasation of blood into the alveoli, bronchial irritation and productive cough with bloody or blood tinged sputum. In general, however, the pulmonary reaction is much less severe than that accompanying ascariasis or strongyloidiasis.[5] Furthermore, since the lesions are produced only by the migrating larvae they are transitory in nature and without sequelae.

Ascaris lumbricoides, the large round worm, on the other hand, may cause serious acute disease of the lungs. Ingested embryonated ova release the contained larvae in the intestinal tract. These penetrate the intestinal mucosa, enter the vascular bed and are carried to the lungs in the blood stream, whence they migrate up the respiratory tract ultimately to reach the small intestine where they complete their development and take up their adult habitat.

Since the larvae are considerably larger than the diameter of the pulmonary capillaries occlusion and immediate damage is produced, which is augmented as they penetrate into the alveolar spaces. There are petechial hemorrhages, extravasation of blood into the parenchyma and into the alveoli, leucocytic infiltration with many eosinophiles and desquamation of the pulmonary epithelium. After reaching the lung the larvae undergo two molts in the course of which they increase from a length of about 0.2 mm. to 1.5 mm. within approximately ten days. When these developmental changes are completed they resume their migration to their final habitat in the intestine. The passage of the larvae from the capillary bed through the lungs is accompanied by pneumonitis, the intensity of which is determined by the intensity of the infection. The sputum is frequently bloody or blood-tinged and the larval worms may be demonstrated in it.[6] Clinically there are the usual phenomena of intoxication accompanied by leucocytosis with eosinophilia. The indications of pulmonary pathology vary from those of a patchy bronchitis to confluent lobular or even a lobar type of pneumonia. The severe lesions are more usual in children since they are commonly exposed to more intense infections than are adults. Although death may occur in these severe cases in the acute stage, there is usually no demonstrable residual pathology in the lung after the period of larvae migration is completed.

The round worm *Strongyloides stercoralis* may cause severe acute and chronic disease of the lung. Infection is acquired, as is the case with hookworm, by contact of the unprotected skin with soil containing the filariform larvae of the parasite. These gain access to the subcutaneous venulea and are carried to the lung whence they migrate through the air passages to the pharynx ultimately to reach the colon, their normal habitat.

The migration from the capillaries into the pulmonary alveoli is accompanied by hemorrhage, cellular infiltration, and signs and symptoms of bronchitis or pneumonitis which may be quite severe. In some instances, however, migration is incomplete and certain precocious individuals penetrate the bronchial or tracheal epithelium where they remain and develop to maturity. If both male and female worms are present, reproduction occurs with oviposition in the pulmonary tissues, release of rhabditiform larvae which may be recovered from the sputum, and the development of chronic bronchial disease, pulmonary strongyloidiasis. The larvae have been found in both pleural and pericardial effusions. This disease has not been completely studied. It is probable, however, that it occurs only in severe massive infections.

Recommended treatment consists of the intravenous administration of medicinal gentian violet in individual doses of 25 cc. of an 0.5 per cent aqueous solution.

In a discussion of parasitic infections of the lung trichinosis should be mentioned because of the not uncommon occurrence of respiratory symptoms. The migrating larvae released in the intestinal mucosa by the gravid female are transported throughout the body by the blood stream to reach striated muscle which they invade and in which they encyst. Many of the larvae undoubtedly are filtered out in different tissues where they are destroyed. The occasional occurrence of hemoptysis in the course of the acute disease may represent a transitory reaction in the lung. No specific pulmonary pathology is produced, however, and the deaths from pneumonitis are to be ascribed to intercurrent bacterial infection rather than to a direct action by the parasites. The affinity of the larvae for the diaphragm, the intercostal muscles, and the larynx is responsible for the not uncommon respiratory embarrassment and the occasional occurrence of pleurisy.

The Phylum Platyhelminthes or flat worms include two groups which produce specific pathologic changes in the human lung; certain trematodes or flukes, and certain cestodes or tapeworms. The important trematodes are *Paragonimus westermani, Schistosoma mansoni, Schistosoma hematobium,* and *Schistosoma japonicum*. The flukes require particular snail intermediate hosts for development of the stage infective to man. No suitable snail hosts are known on the North American continent and consequently infections by these parasites are restricted to foreigners who have been resident in endemic areas and to those of our own citizens who have been in such regions.

The lung fluke *Paragonimus westermani* is the etiologic agent of so-called endemic hemoptysis. The infection has a rather strict geographical distribution determined by the availability of suitable

intermediate hosts. It occurs in certain parts of Africa, the Orient, and some areas in South America.

Its life cycle is complicated. The early developmental stages are carried through in certain specific snails following which a further developmental period in crayfish and fresh-water crabs is required for maturation of the forms infective to man. Infection occurs when these crustacea are eaten raw. After ingestion the larval parasites pass through the wall of the intestine into the peritoneal cavity, migrate through the diaphragm and penetrate the lung parenchyma, commonly localizing in the immediate vicinity of small bronchioles.

A surrounding inflammatory reaction occurs with parenchymal necrosis and the formation of an inclosing fibrous capsule. The resulting cysts containing the adult worms and bloody or purulent fluid in which many ova are present, commonly communicate with a bronchiole or bronchus. The parenchyma about the cysts is atalectatic and at times hemorrhagic. In long-standing infections large areas of atalectasis and at times abscess formation occur distal to the lesion. In other instances the ova discharged into the bronchi are aspirated to other areas of the lung where they lodge and act as foreign bodies inducing the formation of pseudotubercles.

The clinical picture of paragonimiasis is predominantly that of a chronic bronchitis or bronchiectasis with morning cough productive of tenacious or brownish sputum in which ova of the parasite may be demonstrated. Hemoptysis is not infrequent, and when cysts are present in close proximity to the pleura there may be pleural pain or pleural effusion. Treatment is unsatisfactory.

The blood flukes or schistosomes commonly inhabit the veins of the abdominal cavity in the distal radicles of which the ova are deposited. The pathologic changes produced by these infections are primarily due to the irritative effect of the ova and generally are most pronounced in the intestinal tract, the urinary bladder, the liver and the spleen.

These parasites likewise require particular species of snails as their intermediate hosts in which the stage infective for man develops. Suitable hosts are not known on the North American continent. The geographical distribution of *Schistosoma hematobium* is largely restricted to Africa; *Schistosoma mansoni* is endemic in Africa, parts of South America and certain islands in the Caribbean including Porto Rico; *Schistosoma japonicum* is found only in the orient including the Philippines and particularly the island of Leyte where numbers of our troops were infected in combat. Attention has been attracted particularly to *Schistosoma japonicum* infections because of the occurrence of some 1,600

recognized cases among our troops in the campaign on Leyte,[7] and because these infections if not cured carry an ominous prognosis.

The infective forms of the schistosomes leave the tissues of the intermediate snail host for a brief free-living existence in fresh water during which they must reach their definitive host to survive. These cercariae when they come into contact with exposed skin penetrate into the peripheral venules, are carried by the blood-stream to the intra-abdominal veins where development is completed and oviposition occurs.

The pulmonary lesions produced by the schistosomes do not differ between the three species. It has been suggested that the passage of the immature parasites through the pulmonary vascular bed may give rise to a clinical picture resembling lobular pneumonia. The more important lesions, however, are produced by ova which are carried by the venous stream from the site of oviposition to lodge in the vessels of the lung. This induces an acute granulomatous lesion surrounding the ovum with cellular infiltration and necrosis. The adjoining parenchyma is involved by a fibrinous exudate filling the alveoli in which there are numerous cellular elements principally macrophages and eosinophiles.[8] Abscess formation may occur. As the lesion becomes chronic the exudate disappears, the degenerated ovum is inclosed in a dense fibrous capsule and deposition of calcium occurs. In instances when there is extensive involvement of the lung x-ray examination during the acute stage may yield the typical radiologic picture of miliary tuberculosis.

The pathologic process in the lung naturally cannot be affected by therapy. Treatment by tartar emetic or fuoadin kills the adult worms thus preventing progressive increase in the number of lesions.

Two of the cestodes may cause serious pulmonary disease: *Taenia solium* the "measly-pork" tapeworm, and the dog tapeworm *Echinococcus granulosus*. Both of these parasites are widely distributed. The pathologic changes which the former induce are produced by the larval stages of the parasite which undergo altered or abnormal development in man, an accidental and abnormal intermediate host.

The pork tapeworm has a cosmopolitan distribution and is found throughout the world wherever raw or incompletely cooked pork is consumed. It is rare on the North American continent. Man is the definitive host, the host of the adult worm, and the hog is the usual intermediate host in which the infective larval forms develop. The adult resident in the intestinal tract does not of itself produce pathologic changes or significant clinical phenomena. In the normal life cycle the infective ova are passed

in the feces, reach the normal intermediate, the hog, and larval development occurs in the musculature of this animal.

Man may become an abnormal intermediate host under two conditions. An individual harboring the adult worm and passing infective ova in the feces may accidentally ingest ova as the result of poor personal hygiene. Or reverse peristalsis may carry gravid proglottids into the stomach with consequent release of the infective onchospheres. In either event the liberated organisms penetrate the walls of the digestive tract and are distributed throughout the body in the blood and lymph streams. The larvae localize predominantly in the subcutaneous tissues, the brain, and not uncommonly in other organs including the lung. In these sites larval development occurs with the formation of the cystic body *Cysticercus cellulosae* which give rise to the clinical disease cysticercosis.

The larvae at first cause an acute inflammatory reaction with tissue necrosis, infiltration with neutrophils, eosinophiles and lymphocytes and stimulation of fibroblast production. Subsequently the parasite becomes inclosed within a fibrous capsule, or necrosis followed by caseation and calcification may occur. It is probable that the larval forms live for at least three years and that another three years elapses before the cysts which measure from 0.5 cm. to 1.0 cm. in diameter become calcified.

During the stage of invasion in the presence of a heavy infection the clinical picture will be that of acute toxemia and pressure symptoms if vital structures are involved. The late stages are characterized by foreign body and pressure phenomena.

The dog tapeworm *Echinococcus granulosus* likewise has a very wide geographical distribution but is decidedly rare in the United States. It is said that only twenty-five cases indigenous to this country have been reported.[4] It is common, however, in many areas occupied by our troops during the war and the notorious affinity between the average American soldier and any dog makes it highly probable that, in the future, cases will be found among veterans.

The adult worm inhabits the intestine of its carrier host and ova passed in the feces are infective. Such ova reach the intestinal tract of man by hands, food, drink or containers contaminated with feces of infected dogs. The contained onchospheres are released in the duodenum, penetrate the intestinal wall and are transported to their final resting place by the blood stream where the surviving parasites develop into hydatidcysts. The majority of the larvae are filtered out in the liver and the lungs.

The initial development of the larva is relatively rapid, and at the end of five months it is about 1 cm. in diameter. Thereafter

growth is slow and it may be twenty or more years before pressure effects give rise to clinical phenomena. Two main types of hydatid cyst occur, the unilocular localized type and the alveolar type which is malignant and metastasizing.

The alveolar cyst wall consists of an inner germinal layer from which brood capsules containing numerous scolices, and daughter cysts are produced, and an outer laminated elastic layer, the whole inclosed in a connective tissue capsule. The alveolar type of hydatid usually develops as the result of trauma or intracystic pressure causing evagination of the germinal layer through the cyst wall and exogenous budding into the surrounding tissues. When this occurs peripheral extension results with infiltration and metastatic spread as viable scolices penetrate blood vessels and lymphatics. This latter type of disease is incurable in the great majority of instances.

Hydatid cyst of the lung is rarely recognized until it has reached relatively large size and is producing significant pressure effects. The clinical picture in such instances is usually not that of acute disease. However, spontaneous rupture may occur into the pleural, the pericardial or the peritoneal cavities causing a violent and sometimes fatal reaction. In other instances the cyst may open into a bronchus and the diagnosis be established by the demonstration of "hydatid sand"—brood capsules and scolices or hooklets in the sputum.

Diagnosis of hydatid disease may be difficult. Eosinophilia occurs in only 20 to 25 per cent of cases. X-ray examination may be very helpful especially if successful in demonstrating daughter cysts within the primary cyst cavity. Diagnostic aspiration should never be attempted because of the twofold hazard of severe reaction due to leakage and absorption of cyst fluid and because of the danger of secondary implantation along the aspiration tract. Intradermal, precipitin and complement fixation tests are reasonably specific and useful diagnostic aids.

The only successful treatment is complete extirpation of the hydatid. The safest procedures include withdrawal of 10 to 15 cc. of cyst fluid and replacement with 10 per cent formalin which destroys the scolices and renders the cyst contents harmless. Following this the cyst may be excised if its anatomical relationships permit, or marsupialized if necessary without hazard of secondary implantations.

SUMMARY

Although diseases of the respiratory tract due to infection by protozoan and metazoan parasites are not common in the conventional practice of medicine they have been encountered with

sufficient frequency to merit consideration. It is probable that such conditions will be recognized more frequently in the future since several million men and women have had overseas service in areas of the world where some of the more important parasites are heavily endemic. The increasing interest of American business in foreign countries implies a constant flow of personnel to these regions, and foreigners are coming to the United States in increasing numbers from many parts of the world. These individuals therefore constitute a very large number of persons who potentially at least may have been exposed to infections which are not endemic in this country.

Investigation of clinical problems in such a group necessitates the application of geographical medicine—the interpretation of clinical data in the light of the travels of the particular patient and the geographic distribution of particular parasites. The infections, therefore, may be grouped from this point of view. Amebiasis, malaria, ascariasis, strongyloidiasis and cysticercosis may be acquired in the United States as well as in many other parts of the world. On the other hand paragonimiasis and schistosomiasis cannot be acquired on the North American continent, and endemic hydatid disease is so rare in this area as to be virtually nonexistent.

In the consideration of future medical problems among veterans it is of the utmost importance that these implications of geographical medicine be given due consideration. It is equally important to recognize the fact that there may be a prolonged latent period, in some instances years in duration, between infection and the development of the resultant clinical syndrome.

RESUMEN

Aunque las enfermedades de las vías respiratorias causadas por infecciones con parásitos protozoarios o metazoarios no son comunes en la práctica convencional de la medicina, sí se las encuentra con suficiente frecuencia para que merezcan consideración. Es probable que se reconozcan estas condiciones más frecuentemente en el futuro, ya que varios millones de hombres y mujeres han prestado servicios militares en zonas mundiales donde algunos de los parásitos más importantes son sumamente endémicos. El interés creciente del comercio americano en países extranjeros ha causado una corriente constante de viajeros a esas regiones y los extranjeros de muchas partes del mundo llegan a los Estados Unidos en números crecientes. Por consiguiente, estos individuos constituyen un número muy grande de personas que, por lo menos potencialmente, pueden haber estado expuestos a infecciones que no son endémicas en este país.

La investigación de problemas clínicos en tal grupo necesita la aplicación de la medicina geográfica—la interpretación de los datos clínicos a la luz de los viajes del paciente individual y de la distribución geográfica de los parásitos en cuestión. Por consiguiente, pueden ser agrupadas las infecciones desde este punto de vista. La amibiasis, la malaria, la ascaridiosis, la estrongiloidosis y la cisticercosis pueden adquirirse en los Estados Unidos lo mismo que en muchas otras partes del mundo. Por el contrario, la paragonimiasis y la esquistosomiasis no pueden adquirirse en el continente norteamericano y la enfermedad hidática endémica es tan rara en esta zona que casi que no existe.

En el futuro cuando se consideren los problemas médicos de los veteranos es de suma importancia que se le preste la debida atención a estas complicaciones de la medicina geográfica. Es de igual importancia que se reconozca el hecho de que puede ocurrir un período latente prolongado, que dura años en algunos casos, entre la infección y el desarrollo del síndrome clínico resultante.

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Discussion

HUGH G. WHITEHEAD, M.D., F.C.C.P.
Baltimore, Maryland

Dr. Mackie is to be congratulated on his comprehensive presentation on this important and difficult subject. We should bear in mind parasitic etiology in any lung disorder in which the cause is obscure. During the 5 years in the Navy in which I spent about half the time in Naval Hospitals and in the Southwest Pacific,

I cannot remember seeing any proved instance but I am sure that they occur more frequently than we think. Certainly the malarial parasites must get into the vascular bed of the lung and occasionally set up an inflammatory process there and the same thing can be said for E. Histolytica. In view of this fact, I would recommend that a routine stool examination be done on every case of lung infection.

The Utilization of Collapse Therapy*

The sub-committee on Non-Surgical Collapse Therapy in May 1948 embarked on a special study to determine the kind of therapy that is being used in the commonly seen, uncomplicated cases of pulmonary tuberculosis.

The members of this sub-committee are as follows:

Benson Bloom, M.D., Tucson, Arizona
W. LeRoy Dunn, M.D., Washington, D. C.
Alfred Goldman, M.D., St. Louis, Missouri
James J. Hennessey, M.D., Hartford, Connecticut
John S. Packard, M.D., Allenwood, Pennsylvania
Giles Wolverton, M.D., Dayton, Ohio
Harold G. Trimble, M.D., Oakland, California, *Chairman*

Your committee selected ten cases of pulmonary tuberculosis representing problems seen regularly by any consultant in diseases of the chest. There are no trick cases or unusual problems in this group. The plan was to get a cross-section of opinion as of June 1948 regarding the treatment of these relatively common types of pulmonary tuberculosis. These opinions were then tabulated for the following report.

A brief case history and a questionnaire (reproduced in full for Case I, see below) and a 4 x 5 reproduction of the first chest x-ray, for each of the ten cases, was sent to each of the doctors participating.

Neither the chairman nor any of the committee members were responsible for filling out any of the questionnaires nor advising on the therapy in any individual case. The committee members were asked to select the names of men who by experience and position, were best qualified to discuss collapse therapy in their respective areas. As the committee had been appointed with geographical distribution in mind, this was easily possible. The committee members were further asked to select men who were in the actual clinical practice of diseases of the chest, not necessarily public health officers or hospital administrators or x-ray men or pathologists. The illustration will show the geographic distribution of the men participating.

There was remarkable response on the part of the physicians selected. Of the fifty-nine sets of films and questionnaires sent out, fifty-seven replies had been received at the time this tabulation was completed. The following study is based on these fifty-

*A study by the Sub-Committee on Non-Surgical Collapse Therapy of the Committee on Management and Treatment of Diseases of the Chest. Presented to the Board of Regents, American College of Chest Physicians at the 14th Annual Meeting, Chicago, Illinois, June 20, 1948.

seven replies. You will note a slight discrepancy in the figures from case to case, as not all of the men answered each question. We are giving you the results of their answers exactly as received.

The following participated in the study:

Anderson, Russell, M.D., Erie, Pennsylvania
Andosca, John B., M.D., Mattapan, Massachusetts
Avery, Roscoe, M.D., Barre, Vermont
Aven, Carl C., M.D., Atlanta, Georgia
Bloch, Robert G., M.D., Chicago, Illinois
Bonner, M. D., M.D., Jamestown, North Carolina
Brasher, Charles, M.D., Mt. Vernon, Missouri
Brock, Benjamin, M.D., Downey, Illinois
Brown, Cabot, M.D., San Francisco, California
Brown, R. Kyle, M.D., Greenville, South Carolina
Cake, Charles, M.D., Washington, D. C.
Carman, Frank, M.D., Dallas, Texas
Chernyk, Maurice, M.D., Denver, Colorado
Childerhose, Ross K., M.D., Harrisburg, Pennsylvania
Cole, Dean B., M.D., Richmond, Virginia
Castellano, Martin, M.D., Newark, New Jersey
Crellin, J. A., M.D., Philadelphia, Pennsylvania
Crimm, Paul D., M.D., Evansville, Indiana
Flance, I. J., M.D., St. Louis, Missouri
Fleishman, Max., M.D., Omaha, Nebraska
Francis, Byron, M.D., Seattle, Washington
Friedman, Bernard, M.D., St. Louis, Missouri
Glenn, Elmer, M.D., Springfield, Missouri
Greco, Edward A., M.D., Portland, Maine
Greer, Alvis E., M.D., Houston, Texas
Hayes, E. W., M.D., Monrovia, California
Head, Jerome R., M.D., Chicago, Illinois
Hetherington, L. H., M.D., Pittsburgh, Pennsylvania
Hodil, E. R., M.D., Allenwood, Pennsylvania
Hudson, William A., M.D., Detroit, Michigan
Jacobs, Sydney, M.D., New Orleans, Louisiana
Joannides, Minas, M.D., Chicago, Illinois
Kelley, Julius G., M.D., Pocasset, Massachusetts
Kerr, Robert B., M.D., Manchester, New Hampshire
McKay, Donald R., M.D., Buffalo, New York
Mark, Louis, M.D., Columbus, Ohio
Murphy, Paul, M.D., St. Louis, Missouri

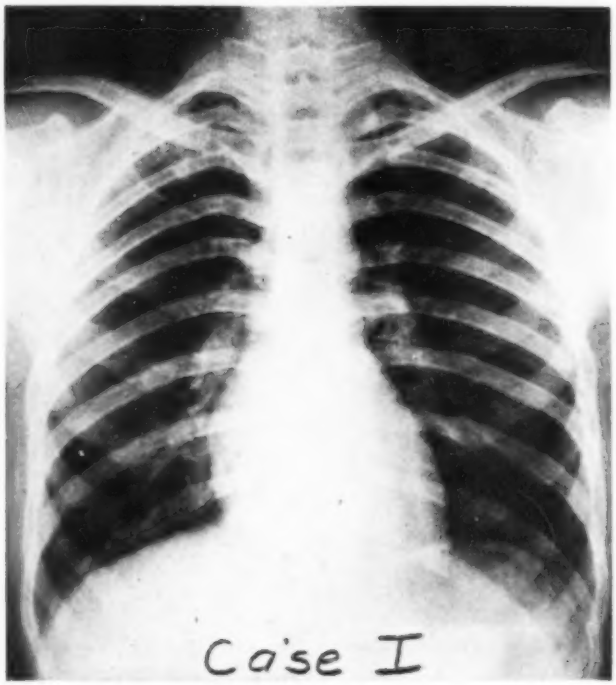
Geographical distribution of physicians participating in survey—57 men representing 32 states answered queries.

Myers, Jay Arthur, M.D., Minneapolis, Minnesota
Odell, James M., M.D., The Dalles, Oregon
Ornstein, George, M.D., New York, New York
Placak, Joseph C., M.D., Cleveland, Ohio
Quinn, Robert, M.D., Santa Rosa, California
Randolph, Howell, M.D., Phoenix, Arizona
Rest, Arthur, M.D., Denver, Colorado
Ringer, Paul H., M.D., Asheville, North Carolina
Rubin, Eli H., M.D., New York, New York
Salkin, David, M.D., Hopemont, West Virginia
Schaffle, Karl, M.D., Asheville, North Carolina
Skavlem, John H., M.D., Cincinnati, Ohio
Sokoloff, Martin, M.D., Philadelphia, Pennsylvania
Stafford, Frank B., M.D., Charlottesville, Virginia
Stygall, James H., M.D., Indianapolis, Indiana
Terrill, Frank, M.D., Deer Lodge, Montana
Tonolla, E. Howard, M.D., Baltimore, Maryland
Turner, Paul A., M.D., Louisville, Kentucky
Ulmar, David, M.D., New York, New York
Vest, Walter E., M.D., Huntington, West Virginia
Wilson, Redford, M.D., Tucson, Arizona
Zambarano, U. E., M.D., Wallum Lake, Rhode Island

Case Histories and Discussions

Case 1: Mr. R. V. E. This 18 year old white male was found to have a small lesion in his right upper lung field on routine chest x-ray during a Navy induction examination. He feels perfectly well and has no symptoms. Past and family history—non-contributory. No known exposure to tuberculosis.

Physical examination negative. Intradermal tuberculin positive to 0.01 mgm. O. T. Gastric lavage with guinea pig inoculation showed, at



A minimal right apical lesion in an 18 year old boy.

autopsy, typical tuberculous lesions from which acid-fast bacilli were recovered.

Chest x-ray shows a small mottled infiltration at periphery of the right lung field under first anterior interspace.

1) Would you use collapse therapy in this patient?
2) If so, what kind?
3) When?
4) If collapse therapy is used,
    a) How long would you continue it?
    b) What would be your criteria for stopping it?
5) Is streptomycin indicated?
6) If so,
    a) When?
    b) What dose?
    c) How long?
7) Remarks:
    a) How long would you keep this patient in bed?
        (1) Before collapse therapy?
        (2) After collapse therapy (if used)?
    b) Other.

Discussion: The panel was about equally divided as to whether collapse therapy should be used or not, with 10 per cent more favoring no collapse therapy; that is, 25 to 31. The choice of collapse was between pneumothorax and phrenic, with pneumothorax being about three times as popular; 18 to 7. Of those favoring collapse, a great majority would begin immediately or within one month, with only 3 waiting for two or three months.

Five would keep this patient in bed following collapse for one month, one-half for six months or less, while 3 would continue bed rest for one year.

Pneumothorax would be maintained for 2 to 3 years, more favoring 3 years, 1 for one year and 1 for four years.

In the collapse group, streptomycin was advocated by only 1 (plus phrenic), and in all cases five times only.

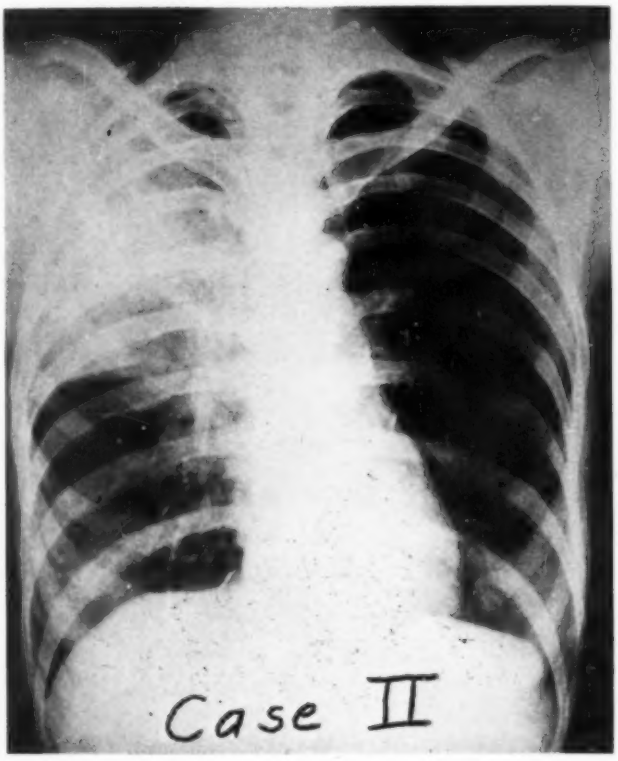
In the "non-collapse" group, 4 would use ambulatory observation only. Six would use bed rest for 2 to 3 months. The majority would keep this patient in bed for 4 to 6 months or longer (3 for 7 to 12 months), and 8 gave no, or inadequate answer. Strange as it may seem it actually appears that, even leaving out the cases treated by ambulatory observation only, in this "non-collapse" group more would treat this patient with six months or less of bed rest than is true in the group who felt the lesion was serious enough for collapse therapy. This would seem to be a real difference of opinion as to the seriousness of such a lesion in an 18 year old boy. It does appear that those favoring conservative therapy were not so sure of their procedure as 8 (more than one-fourth) gave an inadequate or no answer to the question as to how long to

continue bed rest, as compared with only 2 such inadequate answers in the collapse group.

Case II: Mrs. J. S. This 31 year old white married female developed an acute upper respiratory infection in January followed by productive cough and fever. She had a hemoptysis and then visited her physician. Past history revealed a negative chest x-ray three years previously. Another film in May of the preceeding year was said to show a "spot" on her lung. For the past three to four years, she had noted weakness and easy fatiguability, which she attributed to excessive menstrual flow.

Chest x-ray shows a diffuse homogeneous density occupying the upper half of the right lung field, containing a cavity. Sputum was positive on smear for tubercle bacilli.

Discussion: A large majority favored collapse therapy—nearly 3 to 1 (41 to 16). The choice of collapse: none chose a phrenic nerve operation; 30 chose right pneumothorax (1 with phrenic); 3 pneumoperitoneum; and 8 thoracoplasty. Of those who chose pneumothorax, 15, or one-half, would start immediately; 7 after one month; 4 after two months; 3 after three months; and 1 after four to six months. Three of the 8 thoracoplasties would be done immediately or within a month; 5 would wait two to six



Far advanced, tuberculous pneumonia in a 31 year old white woman.

months; and all of these doctors would use streptomycin.

The amount of bed rest expected, after collapse was begun, showed a marked variation, from one month to two years. More than half those answering this question felt that it should be continued for from seven to twelve months. There were 10 inadequate answers for this question. All of those advocating thoracoplasty felt that bed rest following surgery would not be necessary for longer than six months.

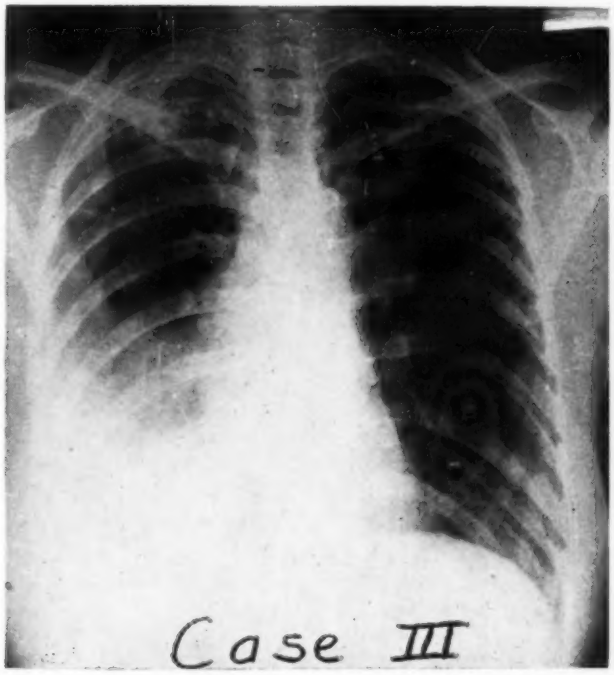
The time recommended to continue pneumothorax varied from two to five years; 12 of the 30 from four to five years, and 11 for three years, assuming an adequate collapse.

Streptomycin was advocated by 40 of the panel, 26 combining this with collapse and 18 of these (a little more than half) with pneumothorax. Nearly all of the non-collapse group (13 out of 16) would use streptomycin.

In the "non-collapse" group again, a large number (10 of 16), did not reply as to the amount of bed rest expected.

Case III: Mrs. Z. L. This 43 year old white female, housewife and former nurse, noted the onset of easy fatiguability and occasional pain in her right chest in May. These symptoms persisted and in September she began to have night sweats. On October 11th she developed acute pain in her right chest, dyspnea, chills and fever to 104°.

Chest x-ray revealed a homogeneous density in right pleural cavity



Minimal pulmonary tuberculosis bilateral, productive, with pleural effusion on the right, in a 43 year old white female.

(pleural effusion) and infiltration at both apices—more marked on the right.

The patient's mother died of tuberculosis in 1920—coresident.

Clear yellow fluid was aspirated from the right pleural cavity. Guinea pig inoculation of this fluid was negative. Guinea pig inoculation of material obtained on gastric lavage was positive for tubercle bacilli.

Discussion: The panel here was about equally divided as to whether collapse therapy should be used as initial treatment or not. In those who would use collapse the choice was between pneumothorax (21), thoracoplasty (4), pneumoperitoneum (2), and wax plombage (1). No phrenic operations were advised. Three-fourths of the collapse therapy group favored converting to a right pneumothorax after aspiration. The same large majority would begin the collapse therapy usually at once and always within a month, except for 3 of the 4 who would do thoracoplasties and the 1 who would want to do wax plombage, who would wait from two to six months.

The seriousness of effusion complicating such a lesion is brought out by the fact that two-thirds would keep this patient in bed for over 7 months to a year (1 for two years) following collapse, although there were nine indefinite answers.

The length of time pneumothorax should be maintained varied considerably, 4 favoring five years; 3, two years; the majority favoring three years.

Streptomycin would be added to the collapse by 6 of the panel, 5 with pneumothorax. All together 14 men favored using streptomycin, a fairly equal division between the collapse and non-collapse groups.

In the non-collapse group, only one-half (compared with two-thirds of the other group) would keep this patient in bed for as long as seven to twelve months. Again there were 14 answers that were inadequate in this group as compared with 9 in the collapse group, probably indicating less optimism regarding the results of their treatment.

Certainly, again, there is brought out a difference of opinion as to the seriousness of the disease in this patient as shown above by the wide variations in treatment.

Case IV: Mr. W.N. This 63 year old white male noted a productive cough, hoarseness and general run-down feeling in May. He was seen by a physician in June with the above complaints plus pain in the region of the right kidney.

Physical examination revealed rales at the right apex and right base posteriorly.

Chest x-ray shows an area of infiltration at the periphery of the right upper lung field, a wedgeshaped area of increased density at the right hilus and a small patchy infiltration at the right base. Sputum positive for tubercle bacilli.

Urological study negative right kidney. History of left nephrectomy for hydronephrosis 10 years ago. Otherwise past and family history essentially negative.

Discussion: The panel was about equally divided on the use of collapse therapy in this patient, 27 to 30. The choice of collapse was varied: phrenic alone, 3; pneumothorax, 16 (a little more than half, and 1 of these with a phrenic); pneumoperitoneum 6 (4 with phrenics); thoracoplasty, 2. All but 2 would begin collapse therapy within a month.

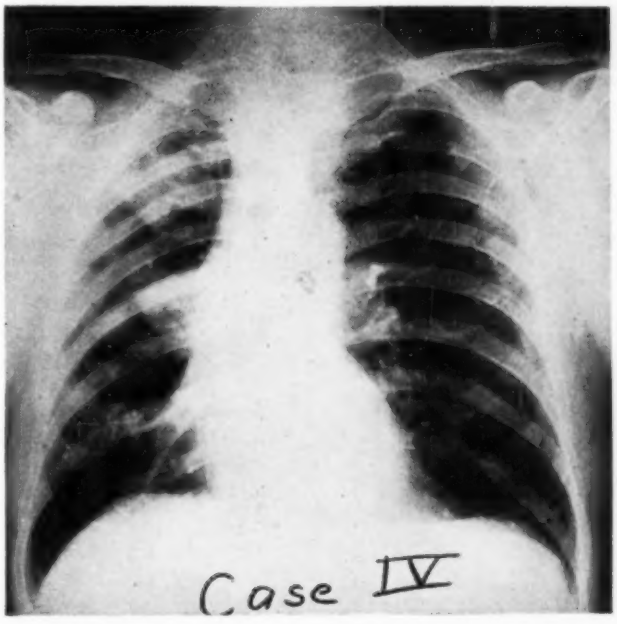
The length of bed rest recommended following collapse varied from one month to a year, without any really predominant period appearing in the answers.

Only 2 would maintain pneumothorax for less than three years, 3 for four years, 2 for five years to life and 3 of the answers were inadequate.

Of the 28 of the panel who would use streptomycin, 10 would combine it with collapse therapy.

In the non-collapse group of the panel, the large majority felt that bed rest would be necessary for seven months to two years, a much longer time than the collapse group, and there were 13 (to 4) inadequate answers. This might indicate a feeling of rather poor prognosis as compared with using collapse therapy.

Many of the panel felt in this case that there was question of tuberculosis of the larynx or tuberculous tracheobronchitis, which



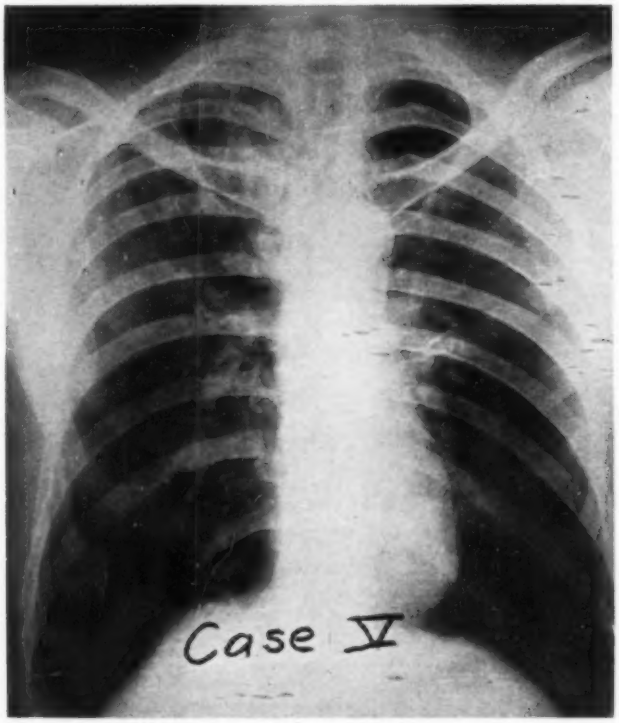
Moderately advanced pulmonary tuberculosis, unilateral, no cavity, acute, in a 63 year old white male.

influenced many to use streptomycin and influenced others away from using collapse therapy, particularly pneumothorax.

Case V: Mr. L. T. This 48 year old white male, school principal, had intermittent chest pain on the left since June one year ago. The following April he developed considerable epigastric distress and lost 10 to 15 pounds over the next few months. In October his chest x-ray revealed a diffuse fine mottling throughout the upper half of the right lung field. Tuberculin test was positive and sputum was positive for tubercle bacilli. Excellent general condition. No other symptoms but a mild morning, slightly productive, cough.

Discussion: The panel here markedly favored collapse therapy, 47 to 10. Choice of collapse was between phrenic operation, 2; pneumothorax, 34; pneumoperitoneum, 4 (2 with, 2 without phrenic); thoracoplasty, 5; and wax plombage, 2. Nearly three-fourths favored pneumothorax. Nearly three-fourths would start collapse immediately, 5 after one month, 3 after two months, 3 after three months, and 2 would wait from four to six months.

The bed rest recommended after collapse varied from one month to two years; 19 recommended from one to three months; 8 from four to six months; and 3 for seven months to two years, a rather wide range of opinion.



Moderately advanced pulmonary tuberculosis, unilateral, no cavity, fibrotic, in a 48 year old white male.

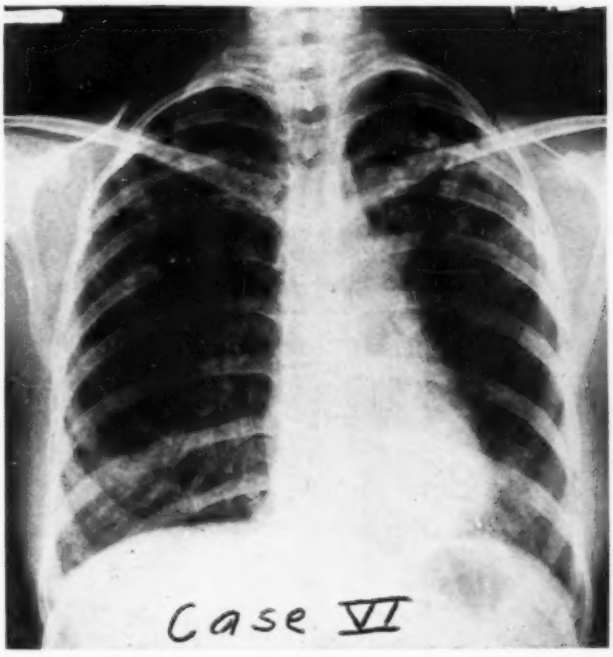
For the time the collapse should be continued, 10 recommended one to two years; 18, three years; 6, four years; and 1, five years. A wide variation, but the three year period was advised by more than all the other periods combined.

Streptomycin was only advocated 8 times in this case, 5 combined with collapse. Three of these were thoracoplasties, and 1 a wax plombage.

Of the 10 panel members who would not use collapse, one-half would expect to keep the patient in bed for six months or less. This represents a marked difference of opinion as to the seriousness of this lesion by a minority group of the panel who would not use collapse.

Case VI: Mrs. F. S. This 29 year old white married female has been underweight and easily fatigued since childhood. Seven years previously she had an upper respiratory infection and lost weight from 95 to 75 lbs. She was fluoroscoped at that time and told that she had tuberculosis but after six weeks she returned to work, no treatment. In June and again in September preceeding her present illness she had pleurisy on the left, was treated with bed rest and sulfa drugs, only until the pain and fever subsided. Now in February a third attack of pleurisy brought her to another physician. Her tuberculin test which was said to be negative several times before was now positive.

Chest x-ray at this time shows several scattered hard densities in both



Far advanced pulmonary tuberculosis, bilateral cavities, acute, with probable tuberculous tracheobronchitis, in a 29 year old white female.

upper lung fields. In addition a soft mottled infiltration at the right apex with a 1 cm. cavity in the right second anterior interspace. There is a more diffuse mottled infiltration in the upper third of the left lung field with a 3 cm. cavity at the level of the left second anterior rib. Sputum positive for tubercle bacilli.

Discussion: A very large majority of the panel favored collapse of some sort, 51 to 6. The choice of collapse was phrenic operations, none; pneumothorax, 26 (left, right, or bilateral nearly equally divided with more than half of those favoring right pneumothorax having a left thoracoplasty in mind); and pneumoperitoneum, 25 (7 of these with a phrenic—side not specified). Note that no phrenic operations were advised alone. Opinion was about equally divided between pneumoperitoneum and pneumothorax. Many of the panel considered this type of patient an indication for initial pneumoperitoneum as compared with the other 5 cases previously reviewed.

The majority of the panel felt that the patient should be at complete bed rest for from one to two years.

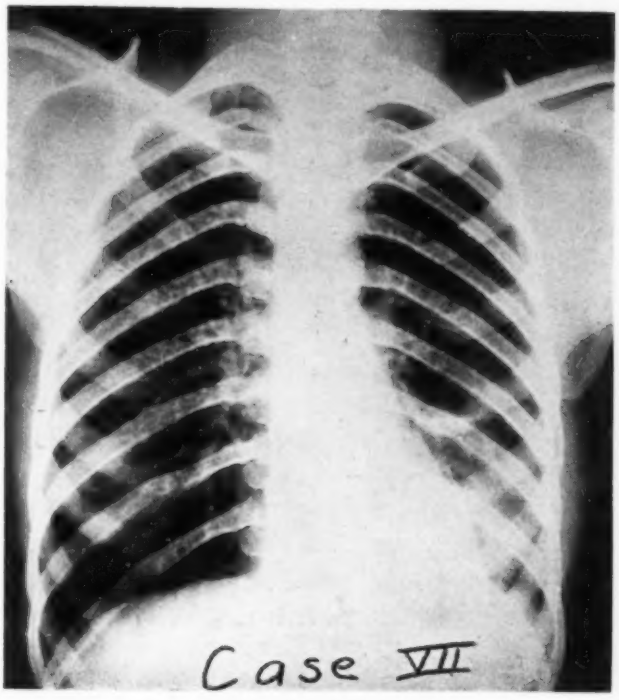
The time that pneumothorax collapse would be continued was about the same as in the previous cases, that is a three year average. With pneumoperitoneum, about half of those using it would continue for two or three years, and half for 4 to 5 years. Interestingly enough, this is approximately the same time and the same percentage as those of the panel who would do pneumothorax felt that pneumothorax should be continued.

Twenty-three would use streptomycin, 18 of these combined with collapse. Nearly all of the non-collapse group on the panel in this case would use streptomycin, grams 1½ daily in divided doses.

One physician advocates the use of the Barach chamber.

Case VII: Mrs. E. B. This 28 year old colored married female had frequent "colds" and an almost continuous productive cough since an attack of pneumonia in September, 18 months ago. She had casual contact with a sister who died of tuberculosis in 1942. On February 6th a chest x-ray revealed a mottled infiltration of miliary type throughout the entire right lung and a 4 cm. hilar cavity with an area of infiltration extending along the border of the cardiac shadow toward the base on the left. Sputum positive for tubercle bacilli.

Discussion: A large majority of the panel (49 to 8) favored collapse of some sort, 1 a left phrenic crush, 20 pneumothorax (14 left, 4 unspecified, 1 bilateral, and 1 left with a phrenic crush—side not specified). Pneumoperitoneum would be used by 28 (18 with a left phrenic). The majority of the panel who would use collapse therapy in this case would use pneumoperitoneum. Eight only would wait as long as two to four months before starting collapse.



Far advanced, bilateral pulmonary tuberculosis, with mottling throughout right and large cavity in the left hilum, in a female Negro, age 28.

The length of bed rest following collapse follows an irregular pattern with the large majority planning one to two years.

Length of time of collapse would vary from two years to life, about one-half feeling three years would be adequate but nearly one-half recommending four to five years with both pneumothorax and pneumoperitoneum.

Forty-nine would use streptomycin, in 41 combined with collapse.

Four of the 8 who would not use collapse therapy hoped for the patient to improve under bed rest so that surgery could be done later and 2 of these felt that cavernostomies might be done, 1 a lobectomy and 1 a pneumonectomy. All of the panel felt that this was a serious problem.

Case VIII: Mr. I. A. This 34 year old male, shipyard worker, had occasional bilateral chest pains for 4 years when, following an appendectomy in January, he developed an ischo-rectal abscess. On July 31, he was rejejcted by the Army because of a "tuberculous cavity" in the right upper lung. On August 18, he had a small hemoptysis followed by fever for several days. He visited a physician, and physical examination plus chest x-ray revealed only a 3 cm. cavity at the right apex. Sputum was positive for tubercle bacilli.

Discussion: The panel were unanimous in this case in favoring some type of collapse therapy. One favored a phrenic; 37 pneumo-

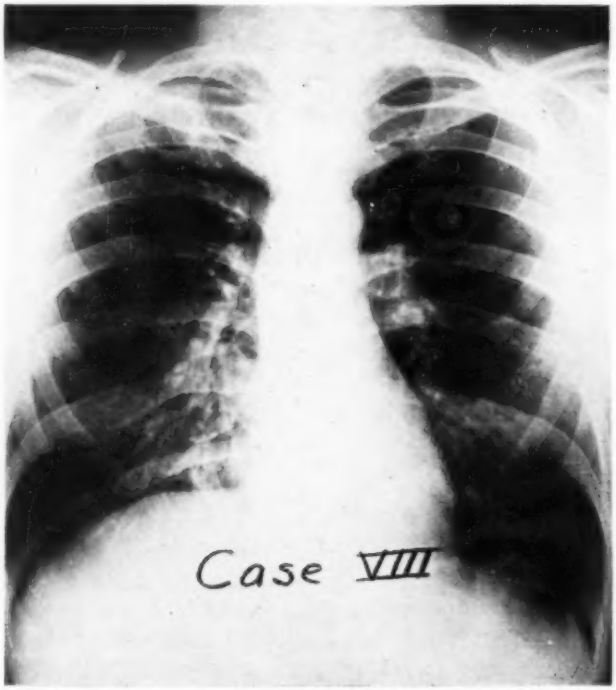
thorax (1 bilateral and 1 with a phrenic); 1 a pneumoperitoneum; and 18 thoracoplasty. Nearly one-third favored thoracoplasty and the large majority would collapse early.

Nearly two-thirds (27) would keep the patient in bed after collapse for six months or less and 18 for seven months to one and one-half years, with 11 inadequate answers. The thoracoplasty group showed a wide divergence of opinion regarding time, as did the pneumothorax group. Bed rest after thoracoplasty: two to three months, 4; four to six months, 6; seven to eleven months, 2; while 5 would keep the patient in bed for from one to one and one-half years.

The time of continuing the pneumothorax collapse showed a marked variation: 9 recommended for two years, 12 for three years, 6 for four years, and 4 for five years.

Streptomycin was only advocated 11 times, 6 of these combined with thoracoplasty.

There was more agreement to the answers in this particular case on choice of therapy and the time involved if the collapse became adequate. The panel seemed also to be more sure of the expected results.



Moderately advanced pulmonary tuberculosis, unilateral solitary 3 cm. cavity, in a 34 year old white male.

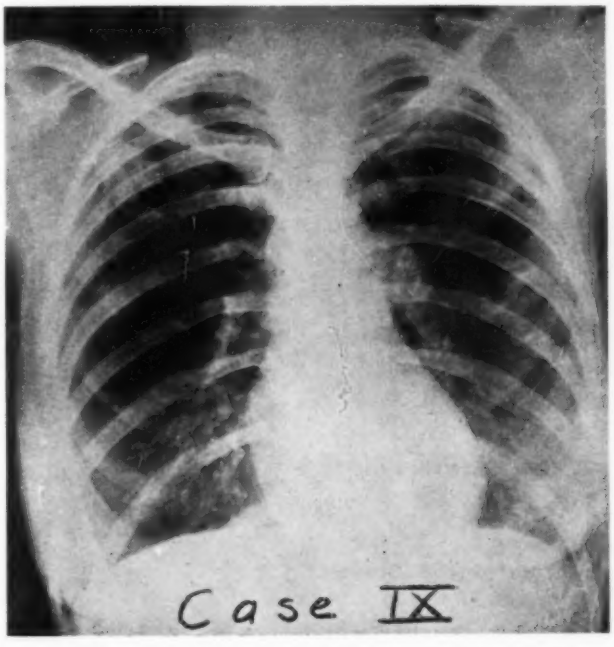
Case IX: Mrs. C. W. This 34 year old white married female felt well until she developed pain beneath the left scapula. She visited her physician at once, who found her intradermal tuberculin to be positive to 0.01 mgm. O. T. A chest x-ray revealed a soft mottled infiltration in both upper lung fields, more extensive on the left. Sputum was positive for tubercle bacilli.

Discussion: The panel was nearly equally divided as to whether collapse therapy should be used in this patient or not, 10 per cent more favoring no collapse therapy as the procedure of choice.

Regarding choice of collapse: none wanted to do a phrenic; 6 would do a left pneumothorax; 10 bilateral pneumothorax; and 10 pneumoperitoneum, to which 2 would add a phrenic operation. The trend away from the use of phrenics is apparent as that procedure was not used by itself in the 57 answers. A little less than two-thirds of the panel favored pneumothorax, while more than one-third would use pneumoperitoneum.

Nearly one-third of the panel would wait a month to three months before starting collapse. The rest would start immediately. Nearly two-thirds felt that this patient should have seven to twenty-four months of bed rest together with these other procedures.

Regarding the duration of collapse therapy: for pneumothorax, two to four years, about one-half stating three years; for pneumoperitoneum, the majority who would use that procedure said



Moderately advanced pulmonary tuberculosis, acute, more extensive on the left, in a 34 year old white female.

four years but 3 of the panel would use it for a shorter time, approximating the time as noted for pneumothorax.

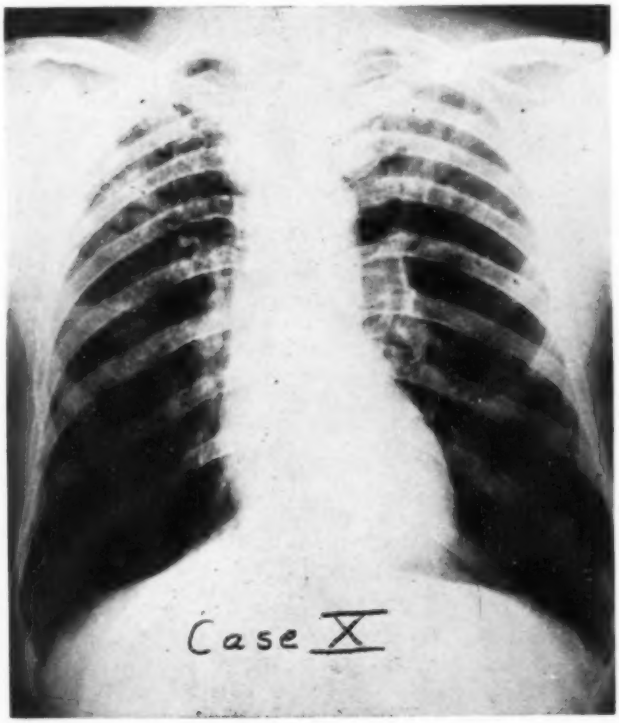
Streptomycin was recommended 21 times but only in 6 instances together with collapse. Half of the group that would not use collapse therapy would rely on bed rest plus streptomycin for this patient.

A large majority of the panel who would not use collapse would expect the patient to be in bed for from one to two years, but only approximately one-half the answers in this group were definite and the replies of the other one-half were inadequate.

One physician advocates the use of the Barach pressure chamber.

Case X: Mr. E. H. This 57 year old white American is a sales manager. No family history of tuberculosis. No known contacts.

Past History: Pneumonia at the age of 14, and again at the age of 21. Present Illness: Two years ago the patient began to feel below par. Prostatis diagnosed and treated. Last year diagnosed "heart trouble." X-ray of his chest finally taken, shows old calcified lesions at the right apex, multiple scattered nodules, little fibrosis, but soft infiltration throughout his right lung in the upper two-thirds. Left lung shows a soft mottling throughout the upper one-third with a 1½ cm. cavity in the first interspace. Sputum was positive for tubercle bacilli. Patient afebrile. Very few chest symptoms. No other medical problem.



Far advanced pulmonary tuberculosis, fibro-caseous lesions in the upper half of both lungs with cavity left, in a 57 year old white male.

Discussion: The panel was equally divided in this patient as to whether to use collapse therapy or not. Of the group favoring collapse, 13 would use pneumothorax, of which 10 would do a left pneumothorax, 2 bilateral, and 1 with a left phrenic. Pneumoperitoneum would be used by 12 including 2 who would add a left phrenic operation. Left thoracoplasty would be done by 3. Those who would use pneumothorax and pneumoperitoneum as collapse therapy were equally divided.

Bed rest following collapse therapy, was advised by the panel for from two months to two years. More than one-third felt one year or more would be necessary.

They would continue collapse in pneumothorax for two to five years, about one-half recommending three years. With pneumoperitoneum, it was advised that collapse be continued for from three to five years but about one-half recommending only three years.

Streptomycin was recommended by 25 of the panel, 12 of whom would combine it with collapse therapy (approximately one-half).

Five of the group who would not use collapse therapy felt that bed rest could be used for less than one year. Eight of this group recommended for from one to three years, but 16 gave inadequate answers. There were only 9 such inadequate answers in the collapse group. Because of the patient's age and the character of the disease, in some instances it was definitely stated and in others the impression was given that many of this group would treat this patient as a custodial case rather than attempt procedures to make him sputum negative and control his lesions.

Discussion of Answers by Extent of Disease

Minimal: The two minimal cases presented are rather too different to really compare one with the other (Cases I and III). The panel was about equally divided as to whether collapse should be used or not and nearly all agreed that when collapse was given it should be started early. The difference of opinion as to the seriousness of minimal disease is brought out in both cases, as is the lack of assurance as to how long to continue bed rest alone when collapse is not used. There is no real agreement as to how long to continue pneumothorax, but by far the majority settle on three years. There were very few phrenic operations advocated, only 7 out of 113 answers. Pneumothorax collapse was the common choice.

Moderately advanced: In comparing the therapy of the moderately advanced cases (IV, V, VII, and IX), it is interesting to note that a phrenic alone was recommended only 6 times in 228 answers; pneumothorax was recommended 103 times; pneumo-

peritoneum 21; thoracoplasty 25 times in 228 total answers or in 177 answers by the group who would use collapse therapy.

The panel showed great lack of agreement as to how long to keep the patient in bed following collapse. This varied from two months to two years. The majority would continue pneumothorax for three years, with a fair number favoring two years and four years about equally.

Far advanced: With regard to the far advanced group (Cases II, VI, VII and X), the panel did not favor using a phrenic alone. Pneumoperitoneum was favored over pneumothorax 65 to 59. Nearly all those using collapse therapy would start the collapse rather promptly.

The amount of bed rest expected varied tremendously. With regard to the length of time to continue pneumothorax collapse, most of the panel favored three to four years, and pneumoperitoneum much the same with a few recommending pneumoperitoneum for five years.

Streptomycin received considerable use in this group.

Discussion of the Cases

Considering the group as a whole, the panel was about equally divided whether or not they would use collapse therapy in the following: For minimal disease; for bilateral, soft, moderately advanced lesions; for more fibrotic, moderately advanced disease involving one lung, with evidence of tracheo-bronchitis, in older age group; for far advanced bilateral fibro-caseous disease. For all other lesions they favored the use of collapse therapy. Note that the panel was unanimous in using collapse therapy in an isolated 3 cm. apical cavity.

Those of the panel who favor collapse expect to have less bed rest and they give more definite answers and fewer inadequate ones.

A majority favor three years for the continuance of pneumothorax collapse with the others varying from two to five years. The figures for pneumoperitoneum were very much the same.

Thoracoplasties are done very promptly by those that consider it the procedure of choice (in more than one-third immediately). The majority using the procedure would precede the thoracoplasty by one or two months of bed rest.

The panel would use a phrenic interruption as treatment in itself but rarely, limited practically to its occasional use in minimal disease.

Pneumoperitoneum would be used by the panel for moderately advanced bilateral exudative disease, for far advanced bilateral

acute cases, for far advanced disease in a Negro, as well as for far advanced bilateral fibro-caseous disease.

Pneumothorax predominates by far as the collapse therapy of choice by the panel, except in moderately advanced bilateral acute disease and far advanced disease, where pneumoperitoneum was used equally or more frequently by the panel. In tuberculous pneumonia a large majority favored collapse with pneumothorax.

Streptomycin is being used for all sorts of lesions but less so for minimals, and to a lesser degree for moderately advanced unilateral fibrotic lesions, with or without cavitation. In these 10 cases, the men of the panel who would use collapse therapy would also use streptomycin 36 per cent of the time. Those of the panel who would in 9 of the cases not use collapse therapy would use streptomycin 46 per cent of the time. In 3 cases the "non-collapse" group would use streptomycin 3 times as frequently; in 2 cases twice as frequently; in 2 other cases definitely, in one case slightly more often; and in 1 case about the same as the figures for the collapse group. (One case had no "non-collapse" group). This shows that those who favored not using collapse therapy tended to rely more on streptomycin than did the group who favored collapse therapy. The "collapse" group did not tend to use streptomycin so often as an initial form of treatment.

In these 10 cases nearly all who used streptomycin would start the drug immediately and nothing statistically significant appeared in comparing individual cases, or by groups according to the extent of disease. About three-quarters would give a dose of one gm. daily, usually in 2 divided doses—with the remaining one-quarter about equally divided into those giving ½ gm. in one daily dose and those giving 1½ gm. to 2 gm. daily in divided doses.

There is a marked variation as to how long to continue the drug (from one to six months) but a very large majority favored six weeks to four months, with more (91) favoring three months than those favoring six weeks (46), two months (38), or four months (30). Thirty more favored three through six months as compared with those who favored one through two months.

A few interesting variations in the use of the drug were noted. Several start with 2 gm. doses for four to seven days, and then reduce to 1.0 gm. to ½ gm. doses. One advocates 1.0 gm. divided in two doses every other day.

This represents the thinking of the panel as to their use of streptomycin as of approximately June 1, 1948.

Your Committee has been instructed by the Board of Regents of the College to extend this study during the year June 1948 to June 1949 by including selected groups from all of the Chapters

not included in the Continental limits of the United States with the advice and assistance of the Regents representing their respective countries.

A second study on this same material will be done by having these cases presented and the questionaires filled out by all those members of the college present at each of the Chapter meetings. This will give your Committee the opinions of a wide cross-section of the College membership, including many hundreds of replies. These replies may well lend themselves to additional analysis than those presented here.

A third study that has been requested on this material is its presentation at the end of each of the three postgraduate courses on Diseases of the Chest conducted during the current year under the auspices of the College. This will give a third cross-section of opinion for comparative study.

Submitted for the Committee by
Harold Guyon Trimble, M.D.

with the Technical assistance of
J. Lloyd Eaton, M.D.

Comment

The results of this preliminary survey on collapse therapy casts considerable doubt on the value of any collected statistics on the efficacy of such procedures. It is obvious that unless the indications for any given procedure are reasonably standardized and the management of this procedure during the course of the disease has likewise some uniformity, that the end results bear no relationship to each other and are practically impossible of correlation.

This is made particularly clear in this study. Had these been complicated cases, marked differences of opinion might be explained conceivably by the numerous variations and possible changes in the course of the disease. Had the panel been selected at random, it might be said that there was too much variation in the experience of the men questioned. But in this study, the cases without exception were simple and uncomplicated, in fact, they represented the type of case which is used for demonstration and teaching to students. The panel, as can be seen by a reading of the names, is made up entirely of men of standing and experience in collapse therapy. We must therefore say that since these men had, with one or two exceptions, no significant points of agreement that the question of collapse therapy as well as the subjects of indications for bed rest and its duration, and the use of streptomycin, can hardly be said to be utilizable for scientific evaluation.

It is customary for scientific men to base their judgment on

clinical experience and statistical results of treated cases. Is it possible that similar cases have varied so markedly in the hands of different men, or is it possible that some physicians are using prejudice and impressions in place of information. There is, of course, the other possibility, and that is that uncomplicated tuberculosis does as well or as poorly, as the case may be, under any one of the recommended treatments.

This was a study that was long needed and additional work along this line will be required before any of us will be in a position to make definite statements. We are forced to wonder if instead of establishing study sections and large scale clinical studies on streptomycin, whether it might not have been very much more valuable to conduct a large scale study on the subjects of rest and collapse therapy. Up to this moment, most of us believed that although differences of opinion existed, fundamental principles of treatment were agreed upon by all. This study tells us how wrong we have been.

Edwin R. Levine, M.D.

Committee on the Management and
Treatment of Diseases of the Chest:

Donato G. Alarcon, M.D., Mexico City, Mexico
Otto C. Brantigan, M.D., Baltimore, Maryland
Jose Ignacio Baldo, M.D., Caracas, Venezuela
Edward H. Robitzek, M.D., New York, New York
Edwin R. Levine, M.D., Chicago, Illinois, *Chairman*.

Report on the Activities of the Council on Postgraduate Medical Education

The Council on Postgraduate Medical Education of the College has had a very active program in 1948. Postgraduate courses in diseases of the chest sponsored by the College Council have been presented this year in Philadelphia, San Francisco, Chicago and New York City.

The Philadelphia course, given March 15 through 20, in cooperation with the Laennec Society of Philadelphia, was highly successful with 62 physicians registered. The program of the course and the names of the physicians who attended were published in the March-April issue of the journal. The postgraduate course committee in Philadelphia, under the chairmanship of Dr. Chevalier L. Jackson, has announced that another course is being arranged in cooperation with the Laennec Society of Philadelphia for presentation the week of February 28, 1949.

The postgraduate course in San Francisco was presented September 13 through 17, in cooperation with the University of California Medical Extension and Stanford University School of Medicine. This course registered 43 physicians and was very well received. Dr. Stacy R. Mettier, Head of Postgraduate Instruction of the University of California Medical Extension, directed the course with the cooperation of Dr. Seymour M. Farber, Secretary of the California Chapter of the College, and Dr. William L. Rogers, who served as chairmen of the course. A recent letter received at the College Offices from Dr. Mettier has announced a postgraduate course for December 5 through 9, 1949, under similar conditions.

Following is a list of the physicians who attended the postgraduate course presented in San Francisco:

C. W. Anderson, M.D., Van Nuys, California
Ruth Anderson, M.D., Ventura, California
Laszlo S. Arany, M.D., Walla Walla, Washington
Lawrence E. Bach, Capt., M.C., U.S.N., Long Beach, California
Robert W. Baker, M.D., Livermore, California
W. S. Barclay, M.D., San Fernando, California
Harold Birnbaum, M.D., San Fernando, California
Mary C. Block, M.D., F.C.C.P., Santa Ana, California
James M. Bodie, M.D., San Jose, California
Isabella M. Clinton, M.D., Auburn, California
Francis J. Curry, M.D., Ahwahnee, California
Walton M. Edwards, Major, M.C., U.S.A., San Francisco, Calif.
Peter J. Galante, M.D., F.C.C.P., Whipple, Arizona
Frank C. Gibson, M.D., Vancouver, Washington
Sophie L. Goldman, M.D., F.C.C.P., Bakersfield, California
James O. Greenwell, M.D., F.C.C.P., Redwood City, California
Robert M. C. Halbach, M.D., Stockton, California
Alden V. Holmes, Lt. (jg), M.C., U.S.N., Oakland, California
Raleigh M. Hood, Lt. (jg), M.C., U.S.N., San Diego, California
L. Sherman Jennings, M.D., San Francisco, California
Norman C. Johnson, M.D., Oroville, California
Marcel Kahn, M.D., Livermore, California
James R. Keeton, M.D., Lower Lake, California
William E. Larsen, Lt. (jg), M.C., U.S.N., Oakland, California
Joseph McGuinness, M.D., San Francisco, California
Isadore Mallin, M.D., Livermore, California
Solomon Netzer, M.D., F.C.C.P., San Fernando, California
Frank I. O'Neill, M.D., Oroville, California
Angela Piscitelli, M.D., F.C.C.P., San Francisco, California
C. B. Pramuk, M.D., Murphys, California

Edgar Ricen, Capt., M.C., U.S.N., (F.C.C.P.), Corona, California
George O. Roberts, M.D., McGill, Nevada
Emanuel Rollins, Comdr., M.C., U.S.N., Oakland, California
John R. Rupp, M.D., Ojai, California
Findlay P. Rutherford, M.D., F.C.C.P., Santa Clara, California
George D. Saxton, F.R.C.S. (Ed.), Vancouver, B. C., Canada
Adrian R. M. Sears, M.D., Biggs, California
Wilfred L. Shaw, M.D., Van Nuys, California
Hans F. Stein, M.D., Tucson, Arizona
Robert H. Stevens, M.D., Phoenix, Arizona
J. L. Turner, M.D., Oakland, California
John R. Winston, M.D., Temple, Texas
Anton Zikmund, Comdr., M.C., U.S.N., Oakland, California

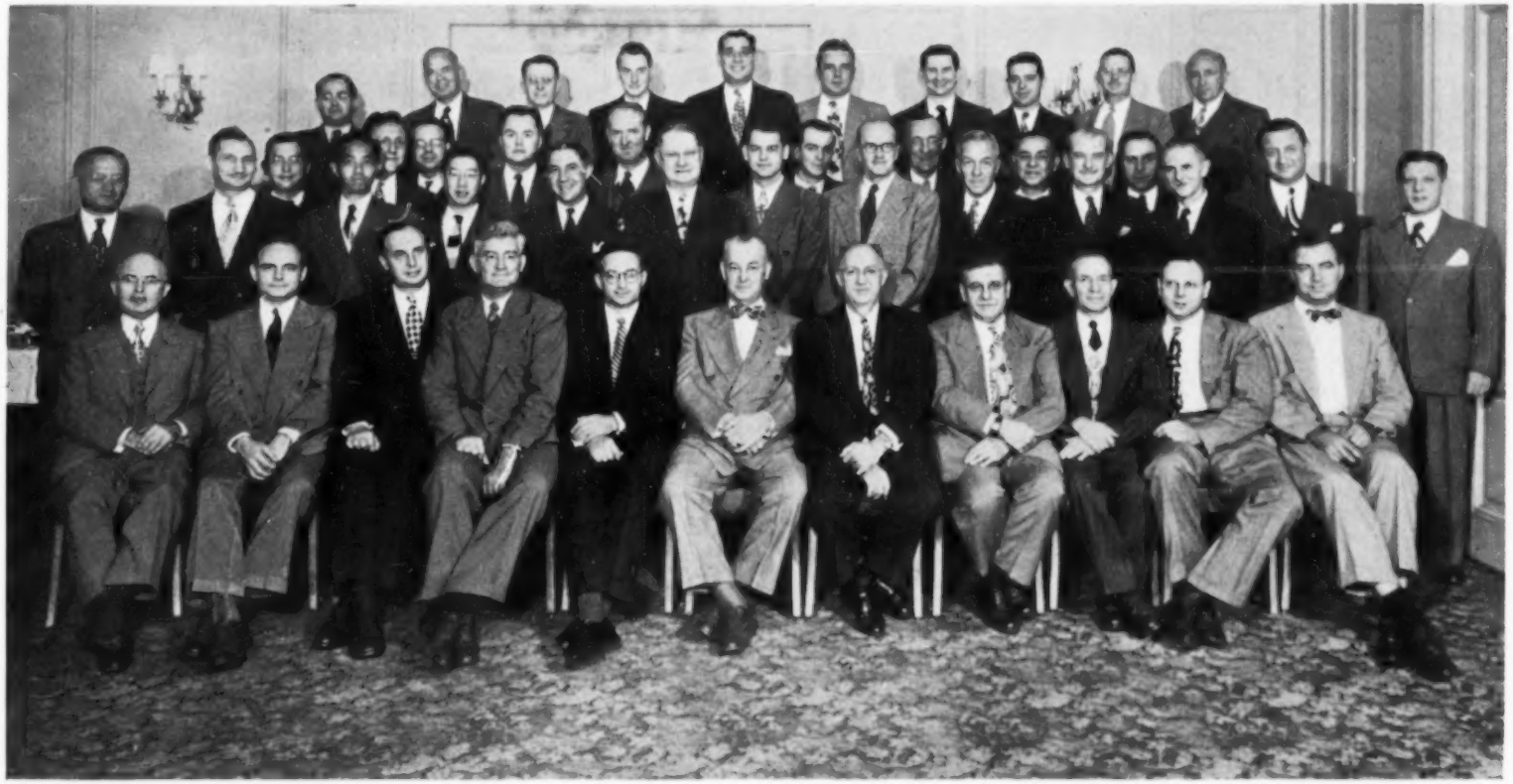
The Third Annual Postgraduate Course in Diseases of the Chest was presented in Chicago during the week of September 20. The course was enthusiastically received by the 44 physicians registered. Dr. Edwin R. Levine served as chairman of the postgraduate course committee and this committee plans to arrange a similar course in the fall of 1949 to be held in Chicago.

The following physicians attended the postgraduate course given in Chicago:

R. M. Anderson, M.D., F.C.C.P., Hackensack, New Jersey
Neil C. Andrews, M.D., Columbus, Ohio
Elmer A. Barron, M.D., Hines, Illinois
Lt. Col. Wilbur C. Berry, M.C., U.S.A., San Francisco, California
Col. Albert A. Biederman, M.C., U.S.A., Augusta, Georgia
Bernard Breitzer, M.D., Chicago, Illinois
Paul J. Breslich, M.D., F.C.C.P., Minot, North Dakota
William C. Cunningham, M.D., Chicago, Illinois
Daniel M. Emerson, M.D., Springfield, Missouri
S. W. Flemming, M.D , Jamestown, North Carolina
Robert F. Fultz, Lieut., M.C., U.S.N., New York, New York
Stanley M. Gates, M.D., Little Rock, Arkansas
Clifton Hall, M.D., F.C.C.P., Springfield, Illinois
J. B. Hall, M.D., Chicago, Illinois
James L. Hawley, M.D., Legion, Texas
Aaron L. Kaminsky, Maj., M.C., U.S.A., Ft. Sam Houston, Texas
W. F. Kammer, M.D., Munice, Indiana
Harold M. Kramer, M.D., Louisville, Kentucky
C. L. Libnoch, M.D., Marion, Illinois
Samuel M. Lobe, M.D., Cleveland, Ohio
C. D. Lufkin, M.D., F.C.C.P., Hot Springs, South Dakota
James L. May, M.D., Cleveland, Ohio
Leo T. Moleski, M.D., F.C.C.P., Grand Rapids, Michigan
George Nedherny, M.D., Chicago, Illinois
Edward G. Nedwicki, M.D., Dearborn, Michigan
O. C. Nickum, M.D., Omaha, Nebraska
Andres G. Oliver, Col., M.C., U.S.A., Keesler, Field, Mississippi
Nell T. Pattengale, M.D., Chicago, Illinois
James C. R. Pen, M.D., Chengtu, China
E. T. Peer, M.D., Hamilton, Ontario
Samuel D. Radin, M.D., Butler, Pennsylvania
Alfred Rasmussen, M.D., Chicago, Illinois
Lyman K. Richardson, M.D., New Orleans, Louisiana
Wyatt E. Roye, M.D., F.C.C.P., Richmond, Virginia
Hyman J. Schorr, M.D., Chicago, Illinois
Joseph A. Sciuto, M.D., F.C.C.P., New Bedford, Massachusetts
W. W. Scott, Col., M.C., U.S.A., Chanute Field, Illinois
Carl Tempel, Col., M.C., U.S.A., (F.C.C.P.), Denver, Colorado
H. J. Treshler, M.D., F.C.C.P., Cresson, Pennsylvania
Victor Y. K. Tyau, M.D., Shanghai, China

THIRD ANNUAL POSTGRADUATE COURSE IN DISEASES OF THE CHEST, AMERICAN COLLEGE OF CHEST PHYSICIANS

September 20-25, 1948, Stevens Hotel, Chicago, Illinois



Some of the physicians and instructors who participated in the Third Annual Postgraduate Course in Diseases of the Chest, of the American College of Chest Physicians.

Herbert L. Walter, Lieut., M.C., U.S.N., Charleston, South Carolina
Charles E. Wiley, M.D., Waukesha, Wisconsin
M. B. Winstead, Maj., M.C., U.S.A., Washington, D. C.
Marion T. Yates, Comdr., M.C., U.S.N., Great Lakes, Illinois

The final postgraduate course for the year 1948 was presented in New York City, November 8 through 13, under the sponsorship of the Council and the New York State Chapter of the College with the cooperation of members of the staffs of the New York City Medical Schools and Hospitals. There were 76 physicians registered at this excellent course, which was arranged by Dr. Frank R. Ferlaino, Secretary of the Council on Postgraduate Medical Education of the College, and Dr. Edgar Mayer, the chairman of the postgraduate course committee in New York.

The following physicians registered for the course:

Sinclair T. Allen Jr., M.D., Burlington, Vermont
M. Alton, M.D., Dublin, Ireland
M. J. Antell, M.D., Bridgeport, Connecticut
Carlos Antonetti, M.D., Havana, Cuba
Silvio Rubens Barbosa da Cruz, M.D., Rio de Janeiro, Brazil
J. A. Belz, M.D., Baltimore, Maryland
John Biezuner, M.D., F.C.C.P., Hamilton, Ontario
I. Bloom, M.D., New York, New York
George D. Boone, M.D., Tucson, Arizona
Judith Borenstein, M.D., Castle Point, New York
R. W. Brand, M.D., Clifton Springs, New York
Jorge Caceres, M.D., Lima, Peru
Charles P. Cake, M.D., F.C.C.P., Washington, D. C.
Harman E. Carr, Lt., M.C., U.S.N., Quonset Point, Rhode Island
John F. Chace, Comdr., M.C., U.S.N., Newport, Rhode Island
Henry P. Close, M.D., Coatesville, Pennsylvania
P. R. Copeland, M.D., Huntington, West Virginia
George M. Davis Jr., Comdr., M.C., U.S.N., Annapolis, Maryland
William E. Denman Jr., M.D., Memphis, Tennessee
Herbert R. Diaso, M.D., Syracuse, New York
David E. Fader, M.D., Augusta, Georgia
David H. Feinberg, M.D., F.C.C.P., Easton, Pennsylvania
Anton Forsberg, M.D., Toronto, Ontario
Ralph Friedlander, M.D., New York, New York
Frank L. Geiger, M.D., Fort Jackson, South Carolina
Andre Gelinas, M.D., F.C.C.P., St. Hyacinthe, Quebec
Charles H. Gingles, Lt. Col., M.C., U.S.A., Washington, D. C.
Roland Gluck, M.D., Brooklyn, New York
Alfred G. Gillis, M.D., Lebanon, Pennsylvania
Joseph Grandi, M.D., Easton, Pennsylvania
P. W. Hardie, M.D., F.C.C.P., Hamilton, Ontario
Frank T. Harrat, M.D., Frostburg, Maryland
John G. Herzfeld, M.D., Nashville, Tennessee
Frederic W. Holcomb, M.D., F.C.C.P., Kingston, New York
Arthur G. Hollander, M.D., Atlanta, Georgia
Christian K. C. Hoyle, M.D., Oteen, North Carolina
Harry J. Hyer, M.D., Charlottesville, Virginia
Stelio Z. Imprescia, M.D., Perry Point, Maryland
Ralph C. John, M.D., Albany, New York
C. Hege Kapp, M.D., Winston-Salem, North Carolina
John F. Keithan, M.D., Asheville, North Carolina
Maurice D. Kenler, M.D., F.C.C.P., New Bedford, Massachusetts
Elmer A. Kleefield, M.D., Forest Hills, New York
Joseph Klugler, M.D., Northampton, Massachusetts
J. A. Leaphart, M.D., Jesup, Georgia
G. Emerson Learn, M.D., Mount Morris, New York
David E. Liston, Col., M.C., U.S.A., (F.C.C.P.),
Fort Totten, Long Island, New York

Willis A. Madden, M.D., Staten Island, New York
Joseph M. Malin, M.D., Staten Island, New York
Luke K. Malley, M.D., F.C.C.P., Dublin, Ireland
Lemuel E. Mayo Jr., M.D., Portsmouth, Virginia
Robert L. McCracken, M.D., F.C.C.P., Nashville, Tennessee
Nathan T. Milliken, M.D., Hanover, New Hampshire
Frank R. Moore, M.D., Athens, Ohio
J. W. Moskowitz, M.D., Great Neck, New York
Irvin L. V. Norman, Capt., M.C., U.S.N., Bethesda, Maryland
Francis E. O'Brien, M.D., Haydenville, Massachusetts
G. Leonard Oxley, M.D., Harrisburg, Pennsylvania
Tarik Pachachi, M.D., Oneonta, New York
George M. Powell, Col., M.C., U.S.A., Fort Dix, New Jersey
Thomas J. Pekin, M.D., Washington, D. C.
Joseph Pisani, M.D., Bronx, New York
John W. Raulston, Lt. Col., M.C., U.S.A., Washington, D. C.
J. A. Redfearn, M.D., F.C.C.P., Albany, Georgia
Harry H. Rosenthal, M.D., New York, New York
Siegfried M. Schoenfeld, M.D., F.C.C.P., New Hyde Park, N. Y.
Herbert F. Schwartz, M.D., F.C.C.P., Salisbury Center, New York
Joseph A. Sciuto, M.D., F.C.C.P., New Bedford, Massachusetts
Yetta Shevell, M.D., F.C.C.P., Otisville, New York
Morris J. Small, M.D., Staten Island, New York
Julius Solovay, M.D., Montgomery, Alabama
Paul W. Spear, M.D., Brooklyn, New York
Henry H. Stelman, M.D., F.C.C.P., Buffalo, New York
Paul V. W. Waldo, M.D., Westhampton Beach, New York
R. E. Whitehead, M.D., Ellis Island, New York
George E. Wilson, M.D., F.C.C.P., Saranac Lake, New York

Dr. Richard H. Overholt, Brookline, Massachusetts, President of the American College of Chest Physicians, lectured in all of the courses sponsored by the College this year. Dr. J. Winthrop Peabody, Washington, D. C., Chairman of the Council on Postgraduate Medical Education, attended the courses held in Philadelphia, Chicago and New York City, and assisted in the arrangements. All members of the College who gave so much of their time and talent for the success of these courses are to be congratulated for their excellent achievements and deserve the sincere thanks of the membership of the American College of Chest Physicians for their efforts.

The members of the Council on Postgraduate Medical Education are:

J. Winthrop Peabody, M.D., Washington, D. C., Chairman
Frank R. Ferlaino, M.D., New York, New York, Secretary
Carl C. Aven, M.D., Atlanta, Georgia
Seymour M. Farber, M.D., San Francisco, California
Lorenz W. Frank, M.D., Denver, Colorado
Edward Lebovitz, M.D., Pittsburgh, Pennsylvania
Edwin R. Levine, M.D., Chicago, Illinois
I. L. Robbins, M.D., New Orleans, Louisiana
Maurice S. Segal, M.D., Boston, Massachusetts

College Chapter News

FLORIDA CHAPTER ORGANIZED

The members of the College in Miami and Miami Beach, Florida held a meeting at the Hotel Martinique, Miami Beach, on Thursday evening, October 21, at which time it was decided to petition the Board of Regents of the College for a Charter to organize the Florida Chapter. Dr. M. Jay Flipse, Miami, Governor of the College for Florida, appeared before the Board of Regents at their Semi-Annual meeting on October 23, at the Hotel Martinique, Miami Beach, and the request for a Charter was granted. Temporary officers for the new chapter were elected as follows:

E. C. Brunner, M.D., Miami, President.
H. K. Edwards, M.D., Miami, Secretary-Treasurer.

A Program Committee for the chapter was appointed by the President, consisting of the following members:

Nathaniel Levin, M.D., Miami, Chairman.
Arnold S. Anderson, M.D., St. Petersburg.
Alexander Libow, M.D., Miami Beach.

ILLINOIS CHAPTER

The Illinois Chapter of the College sponsored a dinner and scientific session at the Congress Hotel, Chicago, on Friday evening, November 12. During dinner the Medical Education Committee discussed plans for the future programs of the chapter. The scientific program presented was as follows:

"Tumor Cells in Bronchial Secretions in Experimental Animals,"
Max Appel, M.D., Champaign, Illinois.

"Cytological Diagnosis of Carcinoma of the Bronchus,"
Theodore T. Bronk, M.D., Chicago, Illinois.

"Tumors of the Chest as Disclosed by Mass X-ray Survey,"
Dan Morse, M.D., F.C.C.P., Peoria, Illinois.

The program terminated with an open discussion by the physicians in attendance.

INDIANA CHAPTER

The Indiana Chapter of the College held a luncheon meeting on October 27 at the Murat Temple, Indianapolis, in conjunction with the meeting of the Tuberculosis Committee of the Indiana State Medical Association. The following program was presented:

"A Resume of the Present Concept of Sarcoidosis,"
Robert G. Bloch, M.D., Chicago, Illinois.

"A Summary of the Results of Streptomycin Therapy in Veterans Hospitals,"
Benjamin L. Brock, M.D., F.C.C.P., Downey, Illinois.

X-Ray Conference.

MISSOURI CHAPTER

The Missouri Chapter of the College will hold a dinner meeting and scientific session at the Chase Hotel, St. Louis, on November 29, the day prior to the opening of the Interim Session of the American Medical Association in St. Louis. Dr. George Saslow, St. Louis, will be guest speaker at the dinner and his subject will be "Psychotherapy in the Treatment of Pulmonary Tuberculosis." A scientific program will be presented as follows:

"Suppurative Diseases of the Lungs,"
Minas Joannides, M.D., F.C.C.P., Chicago, Illinois.

"The Effect of Bronchial Infection on Pulmonary Function,"
Edwin R. Levine, M.D., F.C.C.P., Chicago, Illinois.

"Pulmonary Mobilization by Decortication,"
Tom H. Burford, M.D., St. Louis, Missouri.

PENNSYLVANIA CHAPTER

The Pennsylvania Chapter of the College held its annual meeting at the Hotel Warwick, Philadelphia, on Monday, October 4. Dr. Hurley L. Motley, Associate Professor of Medicine, Jefferson Medical College, was guest speaker at a luncheon meeting. The title of Dr. Motley's excellent talk was "Pulmonary Studies in Respiratory Diseases." Following the luncheon a very interesting X-ray Conference was presented at which cases were presented by Drs. Theodos, Boucot, Bisbing, Szypulski and Ottenberg. The cases were discussed by experts including Drs. Chamberlain, Reimann and Johnson, and followed with general discussion by the physicians present.

A short business meeting was held in the afternoon at which time the following officers were elected for the coming year:

Edward Lebovitz, M.D., Pittsburgh, President.
Archibald Judd, M.D., Hamburg, Vice-President.
John V. Foster, M.D., Harrisburg, Secretary-Treasurer.

The meeting closed with a dinner held at the Hotel Warwick that evening.

ROCKY MOUNTAIN CHAPTER

The annual meeting of the Rocky Mountain Chapter of the College was held on September 22 at Glenwood Springs, Colorado. The meeting was very well attended and great interest was shown in the excellent scientific program presented, as published in the September-October issue of the journal. The following officers of the chapter were elected for the coming year:

Ralph G. Rigby, M.D., Salt Lake City, Utah, President.
Fred R. Harper, M.D., Denver, Colorado, Vice-President.
W. Bernard Yegge, M.D., Denver, Colorado, Secretary-Treasurer.

SOUTHERN CHAPTER

The Southern Chapter of the College held its Sixth Annual meeting in Miami Beach and Miami, Florida, on October 24 and 25, in conjunction with the annual meeting of the Southern Medical Association. The luncheon and annual banquet were very well attended and the scientific

program presented, as published in the September-October issue of the journal, drew a large audience.

At the business meeting of the chapter the following officers were elected for the ensuing year:

Dean B. Cole, M.D., Richmond, Virginia, President.
David H. Waterman, M.D., Knoxville, Tenn., 1st Vice-President.
M. Jay Flipse, M.D., Miami, Florida, 2nd Vice-President.
Hollis E. Johnson, M.D., Nashville, Tenn., Secretary-Treasurer.

CUBAN CHAPTER

On Tuesday, October 26, following the meeting of the Southern Chapter, a group of College members and their wives went to Havana, Cuba to attend a special meeting of the Cuban Chapter that evening. A reception committee, comprised of Drs. Rene G. Mendoza, Gustavo Aldereguia, Jose G. Arrazuria and Antonio Navarrete, of Havana, met the group at the airport and facilitated the customs and immigration procedures for the visiting physicians from the United States.

An excellent scientific program was presented that evening at the Scientific Academy in Havana, as published in the September-October issue of *Diseases of the Chest*. Dr. Rene G. Mendoza, Havana, Vice-President of the Cuban Chapter and Chairman of the Program Committee for the meeting, opened the session with a welcoming speech to the members from the United States. Dr. Louis Mark, Columbus, Ohio, First Vice-President of the College, responded and expressed the pleasure of the visiting physicians in attending the meeting and thanked the Cuban Chapter for their kind hospitality.

The Cuban Chapter gave a cocktail party and dinner for the visiting physicians and their wives on the following evening, October 27. Dr. Cruz Menoz, Havana, President of the Cuban Medical Society, presented a talk at the dinner welcoming the delegation from the United States. Dr. Edgar Davis, Washington, D. C., gave a brief talk in response to Dr. Menoz and expressed the delegation's appreciation of the cordial reception given them.

VIRGINIA CHAPTER

The Virginia Chapter of the College held a luncheon meeting at the John Marshall Hotel, Richmond, on October 19, in connection with the annual meeting of the Virginia State Medical Society. Walter L. Nalls, M.D., F.C.C.P., Alexandria, gave a very interesting talk on "Pneumoperitoneum in the Treatment of Tuberculosis." This was followed by active discussion on the part of the members and visitors present. Dr. Dean B. Cole, M.D., Richmond, President of the Chapter, presided and introduced Dr. J. Winthrop Peabody, Washington, D. C., Past-President and Chairman of the Council on Postgraduate Medical Education of the College, who was a guest at the meeting. Dr. Peabody gave a brief talk on the activities of the College.

WISCONSIN CHAPTER

The Fourth Annual Meeting of the Wisconsin Chapter was held at the Schroeder Hotel, Milwaukee, and was attended by approximately 300 physicians. The program presented at the meeting was published in the September-October issue of the College journal. The following officers of the chapter were elected for the coming year:

George H. Jurgens, M.D., Milwaukee, President.
John K. Shumate, M.D., Madison, Vice-President.
Leon H. Hirsh, M.D., Milwaukee, Secretary-Treasurer.

The Speakers Bureau of the Wisconsin Chapter has supplied the following speakers for meetings of the county medical societies:

Vernon County Medical Society:
"Modern Treatment of Cough,"
Andrew L. Banyai, M.D., F.C.C.P., Milwaukee.
"Differential Diagnosis of Diseases of the Chest,"
Leon H. Hirsh, M.D., F.C.C.P., Milwaukee.

Eau Claire, Dunn and Pepin Counties Medical Society:
"Cystic Disease of the Lung,"
George H. Jurgens, M.D., F.C.C.P., Milwaukee.
"Bronchogenic Carcinoma,"
Mischa Lustok, M.D., F.C.C.P., Milwaukee.

Washington and Ozaukee County Medical Societies:
"Differential Diagnosis of Diseases of the Chest,"
Leon H. Hirsh, M.D., F.C.C.P., Milwaukee.

ORGANIZATIONAL MEETING, URUGUAYAN CHAPTER

Montevideo, Uruguay, July 21, 1948

Sitting, left to right: Drs. Pintos, Jackson, Ugon, Silveira (Brazil), Gomez and Sarno. Background: Drs. Blanco, LeBorgne, Cardozo, Sicardi, Pittaluga, Negro, Caubarrere, Capurro, Araus, Barani and Burgos.

College News Notes

David Salkin, M.D., F.C.C.P., formerly Superintendent of Hopemont Sanitarium, Hopemont, West Virginia, has accepted the position as Chief of Professional Services (Clinical Director), Veterans Administration Hospital, San Fernando, California.

A. L. Starkey, M.D., F.C.C.P., who for many years has served as assistant superintendent of the Hopemont Sanitarium, has been named acting superintendent to succeed Dr. David Salkin.

Donato G. Alarcon, M.D., F.C.C.P., Mexico City, Mexico, presented a paper entitled "Ten Years of Extrapleural Pneumothorax—Discussion of the Technique and Results," at the 38th Annual Meeting of the Texas Tuberculosis Association held in San Angelo, Texas, September 24-25.

Robert J. Anderson, M.D., has been appointed as medical director and chief of the Tuberculosis Division of the U. S. Public Health Service. He succeeds Francis J. Weber, M.D., F.C.C.P., who has been assigned to postgraduate work in psychiatry at Johns Hopkins University. Dr. Anderson was formerly assistant chief of the division.

The Ohio State Medical Association sponsored a postgraduate course on new advances in the diagnosis and treatment of chest diseases, October 21, in Chillicothe. Drs. John H. Skavlem, W. L. Potts, D. W. Heusinkveld, Joseph B. Stocklen, Maurice G. Buckles and Sidney E. Wolpaw, Fellows of the American College of Chest Physicians, lectured in the course.

Hugh L. Houston, M.D., F.C.C.P., Murray, Kentucky, has been elected President-Elect of the Kentucky State Medical Association.

Walter E. Vest, M.D., F.C.C.P., Huntington, West Virginia, editor of the West Virginia Medical Journal, has been re-elected by the Board of Trustees of the American Medical Association as a member of the advisory committee of the Cooperative Medical Advertising Bureau.

NEWLY APPOINTED REGENTS AND GOVERNORS OF THE COLLEGE

Regents:

India: Raman Viswanathan, M.D. ..... New Delhi
South Africa: David P. Marais, M.D. ..... Cape Town

Governors:

Nebraska: Max Fleishman, M.D. ..... Omaha
U. S. Indian Service: Arthur W. Dahlstrom, M.D. ..... Rapid City, S. D.
England: Peter W. Edwards, M.D. ..... Shropshire
India: Prag Nath Kapur, M.D. ..... Delhi
Korea: In Sung Kwak, M.D. ..... Seoul
South Africa:
North: P. J. Kloppers, M.D. ..... Pretoria
South: Theodore Schrire, M.D. ..... Cape Town

ULAST MEETING IN MEXICO CITY

The Union of Latin American Tuberculosis Societies (ULAST) will hold its Eighth Congress in Mexico City, January 23-29, 1949. A special session of the Mexican Chapter of the College will be held in which a number of papers will be presented by its members as well as by members from the United States of America. The following physicians will participate in the special session of the Mexican Chapter:

"Importancia Clínica del Bronquio Segmental y Su Correspondiente Segmento Bronco-Pulmonar,"
Chevalier L. Jackson, M.D., Philadelphia, Pennsylvania.

"A Serious Silent Lesion; Its Rational Management,"
Richard H. Overholt, M.D., Brookline, Massachusetts.

"Tuberculosis and Hospital Personnel,"
Jay Arthur Myers, M.D., Minneapolis, Minnesota.

"A Pathologic Investigation on Tuberculous Pleuritis,"
Henry C. Sweany, M.D., Chicago, Illinois, and
Jose Gomez, M.D., Buenos Aires, Argentina.

"The Treatment of the Residual Cavities after Thoracoplasty by Lucite Packing,"
Frank S. Dolley, M.D., Los Angeles, California.

"The Relation of Chronic Bronchial Infection to the Impairment of Pulmonary Function,"
Edwin R. Levine, M.D., Chicago, Illinois.

"Co-Existent Pulmonary Tuberculosis and Bronchogenic Carcinoma,"
Seymour M. Farber, M.D., San Francisco, California.

"Recent Developments in the Conservative Treatment of the Giant Cavity,"
Donato G. Alarcon, M.D., Mexico City.

The scientific sessions will be held at the Instituto de Cardiologia in Mexico City. A breakfast meeting of all of the Regents and Governors of the College in the Latin American countries will be held during the Congress. The program of the Council on Pan American Affairs of the College will be discussed at this meeting with Dr. Chevalier L. Jackson, Chairman, presiding. It is also planned to have a luncheon meeting at the time of the Congress to which all members of the College in attendance will be invited.

The Officers of the Eighth Congress of the Union of Latin American Tuberculosis Societies are: Dr. Ismael Cosio Villegas, President; Drs. Miguel Jimenez and Donato G. Alarcon, Vice-Presidents; Dr. Fernando Gomez, Perpetual Secretary; Dr. Fernando Rebora, General Secretary; Dr. Manuel Alonso, Secretary of the Exterior; Dr. Carlos Noble, Secretary of the Interior; Dr. Rafael Ibarra, Acting Secretary of the Sessions; Dr. Carlos Diez Fernandez, Secretary of Publications; and Dr. Fernando Katz, Treasurer.

THIRD NATIONAL CONGRESS OF TUBERCULOSIS AND SILICOSIS

The Third National Congress of Tuberculosis and Silicosis will take place during the last week of January, 1949, in Mexico City, in conjunction with the Eighth Congress of ULAST. The officers of the Third National Congress of Tuberculosis and Silicosis have extended an invitation to the members of the American College of Chest Physicians to

attend their meeting. The officers of this society are: Dr. Alejandro Celis, President; Dr. Emilio Esquivel, Secretary; and Dr. Manuel Alonso, Treasurer.

The program and activities to be presented by the Union of Latin American Tuberculosis Societies and the Congress of Tuberculosis and Silicosis, will be of interest to all chest specialists and it is hoped that many College members in North, Central and South America will attend these meetings. The Executive Offices of the College in Chicago will be pleased to assist members in making their hotel reservations and other arrangements.

NEW YORK STATE CREATES MEDICAL ADVISORY BOARD TO THE NEW YORK STATE BOXING COMMITTEE

Recently several deaths have occurred in boxing and wrestling. In an effort to make these sports less hazardous, New York State has enacted a law creating a Medical Advisory Board to the New York State Boxing Commission. New standards and regulations for the pre- and post-bout examinations of boxers and wrestlers will be formulated by the Medical Advisory Board and will be put into effect by the Boxing Commission in an effort to safeguard the health of boxers and wrestlers.

Governor Dewey appointed Frank R. Ferlaino, M.D., F.C.C.P., Brooklyn, New York, as chairman of the nine-physician board.

COURSE IN PHYSIOLOGIC THERAPY IN BRONCHO-PULMONARY DISEASES

Columbia University announces a course, "Physiologic Therapy in Broncho-Pulmonary Diseases" (Medicine PM 1), Monday through Friday, January 24-29, 1949, offered by Drs. Alvan L. Barach, F.C.C.P., H. A. Bickerman and C. Eastlake. The course will deal with the principles of physiologic and antibiotic therapy of bronchial asthma, pulmonary emphysema and fibrosis, chronic bronchitis and bronchiectasis, and pulmonary tuberculosis. The application of techniques will be demonstrated on cases receiving inhalational, aerosol and immobilizing lung chamber therapy. The fee will be $40.00 and is part of the program available for veterans under the G. I. Bill of Rights.

AMERICAN DIABETES ASSOCIATION LAUNCHES CAMPAIGN

The American Diabetes Association is launching a nation-wide drive of diabetes detection and Dr. Howard Root of Boston is Chairman of the committee appointed to carry on with this work. The inauguration of a year-round Diabetes Detection Drive will be National Diabetes Week, December 6 to 12, 1948. College chapters are urged to include material on diabetes detection in their programs. The discovery and treatment of diabetes mellitus at an early stage demands the attention of all practicing physicians. Failure to discover and treat diabetes early, results in preventable disabilities and impairments of health.

Obituaries

CLEMENTE FERREIRA

1857 - 1947

Dr. Clemente Ferreira died on August 6, 1947, at the age of 90. He pioneered a program for the control of tuberculosis in the state of Sao Paulo, Brazil and established several dispensaries at the beginning of this century, introducing pneumothorax in that state. He wrote a great number of papers, both medical and for the layman. In 1880 he wrote his thesis on pulmonary tuberculosis. Just a few days before his death, Dr. Ferreira wrote a paper on "Diazone and Streptomycin."

The control of tuberculosis in Sao Paulo was planned and supervised by Dr. Ferreira. The "Ferreira League," which is the anti-tuberculosis league of the state of São Paulo, was named after him. Dr. Ferreira belonged to many medical societies, among them the International Union Against Tuberculosis and the Union of Latin American Tuberculosis Societies.

Dr. Ferreira was revered by all of his countrymen and his memory will long remain in the hearts of his friends.

LLOYD H. PATTERSON

1910 - 1948

It is with deep regret that we announce the death of Dr. Lloyd H. Patterson, Tuberculosis Physician at the Veterans Administration Hospital, San Fernando, California.

Dr. Patterson passed away at St. Vincent Hospital, Los Angeles, on April 5, 1948. He was born in Holland, Michigan, on May 18, 1910. He received his degree in Medicine at the University of Southern California in 1937; served his internship at Orange County Hospital, Santa Ana, California, and had one year of postgraduate work at Mercy Hospital, New Orleans, Louisiana. Following this, he was employed as Chief Resident Physician at Stonybrook Retreat, Keene, California, for five years and for the past year and a half has been with the Veterans Administration.

Dr. Patterson's wife and two small children survive. The entire staff will feel his loss, for he was respected and admired for his ability as a physician and his kindly attitude toward his patients.

Roy A. Wolford, M.D., Governor for
the Veterans Administration.

BERTHOLD STEINBACH POLLAK

1873 - 1948

Dr. Berthold S. Pollak was born in Vienna, Austria on June 26, 1873 and died in Jersey City, New Jersey on June 27, 1948. After a preliminary education in Vienna, he came to the United States in 1888, and was employed for a time at the wholesale drug firm of Bullock & Crenshaw in Philadelphia. Later he entered the Philadelphia College of Pharmacy,

and in 1891 entered the University of Pennsylvania. In 1895 he transferred to Dartmouth College and graduated the same year. He was licensed to practice medicine in New Jersey in 1898.

Dr. Pollak was first associated with his uncle, Dr. Lewis Steinbach, Professor of Surgery at the Philadelphia Polyclinic Hospital, and then became chief resident at the Pottsville Hospital, Pottsville, Pennsylvania. He moved to Jersey City in 1899 and entered private practice. Dr. Pollak was made the medical director of the Hudson County Tuberculosis Hospital and Sanatorium on February 1, 1907, and in October, 1946 the hospital was renamed in his honor. He was also Medical Director of the Hudson County Tuberculosis Clinics located in various cities of that county.

He was charter member and organizer of the Hudson County Tuberculosis League and also helped organize the New Jersey Tuberculosis League and served as president in 1923-1924. Dr. Pollak was a director of the National Tuberculosis Association, a member of the International Union Against Tuberculosis and was a delegate at the conferences of the latter organization in London, Paris, Lausanne, Brussels, Oslo and Warsaw. He was appointed by President Coolidge to represent the United States at the International Conference in Rome.

Dr. Pollak was a member of a number of medical societies and was a Fellow of the American College of Chest Physicians. At the time of his death, he was vice-president of the New Jersey Chapter of the College. Dr. Pollak made many contributions to the medical literature.

New Jersey has lost one of its outstanding figures in the field of diseases of the chest. His memory will be cherished by his many friends.

Irving Willner, M.D., Governor for New Jersey.

VERA V. NORTON

1877 - 1948

Dr. Vera V. Norton died at St. Joseph's Mercy Hospital, Waverly, Iowa, on August 11, 1948. She attended Northwestern University Medical School and received the degree of Doctor of Medicine in 1899. Following this she interned at Wesley Hospital, Chicago, Illinois for a year. She then entered general practice in Waverly, where she remained until 1912.

In 1913 she joined the staff of the Edward Sanatorium in Naperville, Illinois, where she remained for four years. Following this she became associated with the Hamilton County Tuberculosis Sanatorium, now the Dunham Hospital, in Cincinnati, Ohio. During the latter part of her career at Cincinnati she was Associate Medical Director of the Sanatorium. She practiced here until her retirement in 1941.

She was a Fellow of the American College of Chest Physicians and a member of the American Trudeau Society, Northwestern University Alumni Association and American Association of University Women. Since retirement, she has been a member of the Bremer County Medical Society and Iowa State Medical Society.

Dr. Norton practiced her profession with distinction and won the respect and love of all who were associated with her.

J. Carl Painter, M.D., Governor for Iowa.

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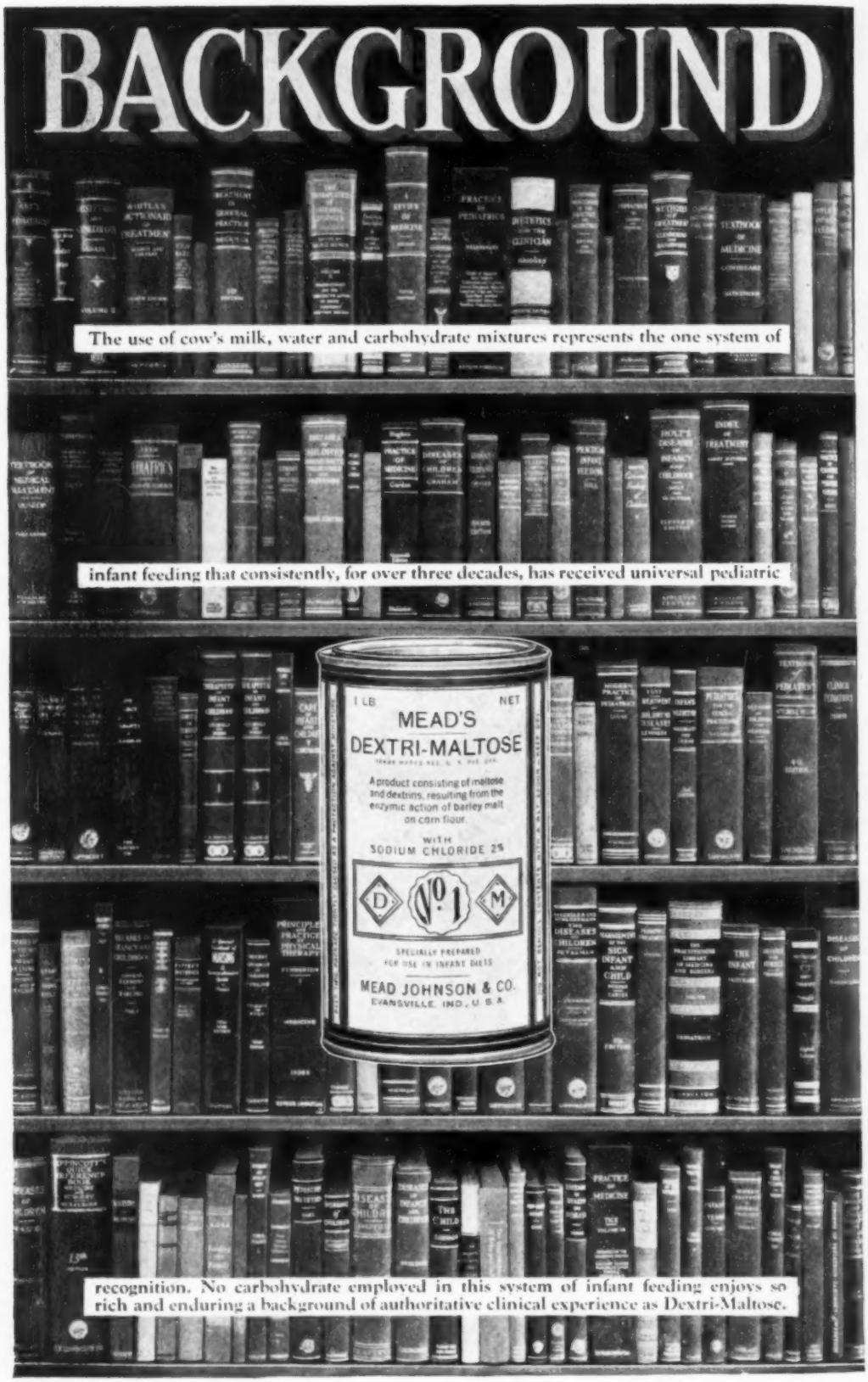
BACKGROUND
The use of cow's milk, water and carbohydrate mixtures represents the one system of
infant feeding that consistently, for over three decades, has received universal pediatric
1 LB NET
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A product consisting of maltose and dextrins, resulting from the enzymic action of barley malt on corn flour
WITH SODIUM CHLORIDE 2%
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recognition. No carbohydrate employed in this system of infant feeding enjoys so
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